





# HOSPITAL DIETARY SERVICES

## A PLANNING GUIDE

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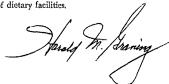
## Foreword

This publication presents guidelines for planning a centralized hospital dietary service for general hospitals having 225 beds or less. Ways of adapting these guidelines to larger hospitals are suggested. Particular consideration is given to methods of operation, equipment, space requirements, physical design, and services. An understanding of the interrelated aspects of each of these factors is essential to achieve maximum efficiency in operating this service.

This material is intended only as a guide. The suggestions presented may need to be adapted to the individual requirements of the institution being planned. The adaptability is emphasized because of the wide variation of designs and services found among dietary facilities.

Although the proposed guidelines are in keeping with present day practice, newer design concepts must continually be evaluated. Automation as well as the many developments in food processing, labor-saving equipment, devices, and techniques are opening completely new approaches to planning for dietary services. Thus, it cannot be urged too strongly that a high degree of flexibility be incorporated in planning.

It is hoped that this guide will prove helpful to dietitians, dietary consultants, architects, engineers, administrators, members of planning and building committees, and all others engaged in the planning of dietary facilities.



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# Contents

	<i>Page</i>		<i>Page</i>
FOREWORD . . . . .	iii	Chapter IV. ANCILLARY DIETARY SERVICES . . . . .	48
ACKNOWLEDGMENTS . . . . .	vii	PATIENT CARE UNITS . . . . .	48
		FORMULA SUPPLY . . . . .	49
Chapter I. PLANNING CONSIDERATIONS . . . . .	1	VENDING OPERATIONS . . . . .	49
PLANNING GROUP RESPONSIBILITIES . . . . .	1	ICEMAKING . . . . .	50
The Written Program . . . . .	2	Chapter V. OFFICE AND PERSONNEL FACILITIES . . . . .	51
Planning Assumptions and Related Factors . . . . .	2	OFFICE . . . . .	51
Planning Principles . . . . .	4	PERSONNEL FACILITIES . . . . .	52
Staffing Requirements . . . . .	5		
Planning Procedures . . . . .	5	Chapter VI. ARCHITECTURAL AND ENGINEERING . . . . .	54
PLANNING FACTORS . . . . .	6	HOSPITAL DESIGN . . . . .	54
		ARCHITECTURAL PLANNING CONSIDERATIONS . . . . .	59
Chapter II. PLANNING INDIVIDUAL AREAS . . . . .	14	COMMUNICATIONS . . . . .	60
RECEIVING . . . . .	14	ELECTRICAL—LIGHTING . . . . .	60
STORAGE . . . . .	16	VENTILATION—AIR CONDITIONING . . . . .	61
FOOD PRODUCTION . . . . .	20	Ventilation Design . . . . .	61
Preparation, Cooking and Baking . . . . .	20	Application of the Ventilation System . . . . .	62
PATIENT MEAL SERVICE . . . . .	28	Air Conditioning . . . . .	63
Tray Service . . . . .	28	Appendix. DIETARY SERVICE EQUIPMENT . . . . .	64
Tray Distribution . . . . .	29	Equipment Classifications . . . . .	64
CATERING SERVICE . . . . .	32		
Serving . . . . .	32	References . . . . .	67
Dining . . . . .	32	Selected Bibliography . . . . .	68
		Books . . . . .	68
Chapter III. SANITATION . . . . .	37	Pamphlets and Periodicals . . . . .	68
DISHWASHING . . . . .	37		
POTWASHING . . . . .	43		
HOUSEKEEPING—OPERATIONS AND MAINTENANCE . . . . .	45		

## TABLES

<i>Number</i>	<i>Page</i>	<i>Number</i>	<i>Page</i>
1. Meals served daily in 50-, 100-, to 200-bed hospitals . . . . .	4	6. Day storage for 3½ days . . . . .	17
2. Temperature and humidity requirements for storing perishable foods . . . . .	16	7. Equipment space requirements . . . . .	24
3. Daily food requirements per person . . . . .	16	8. Dishwashing machine space requirements . . . . .	39
4. Refrigerated storage for 7 days . . . . .	17	9. Waste disposers in food production . . . . .	40
5. Dry storage for 30 days . . . . .	17	10. Minimal requirements of food disposers . . . . .	40
		11. Areas in dietary facilities . . . . .	59

## FIGURES

<i>Number</i>	<i>Page</i>	<i>Number</i>	<i>Page</i>
1. Average number of meals served in hospitals having up to 250 beds . . . . .	3	9. Cart and can washing and trash storage rooms for a 100- to 150-bed hospital . . . . .	47
2. Receiving entrance for a 100- to 150-bed hospital . . . . .	15	10. Dietary office and personnel facilities for a 100- to 150-bed hospital . . . . .	52
3. Dietary storage area for a 50- to 75-bed hospital . . . . .	19	11. Flow diagram of food from receiving to service . . . . .	55
4. Food production area for a 100- to 150-bed hospital . . . . .	27	12. Centralized dietary department serving 80 to 125 meals at peak noon period. (For hospitals in a 50- to 75-bed range.) . . . . .	56
5. Patient tray serving area for a 100- to 150-bed hospital . . . . .	31	13. Centralized dietary department serving 180 to 280 meals at peak noon period. (For hospitals in a 100- to 150-bed range.) . . . . .	57
6. Cafeteria and dining room for a 100- to 150-bed hospital . . . . .	36	14. Centralized dietary department serving 380 to 430 meals at peak noon period. (For hospitals in a 200- to 225-bed range.) . . . . .	58
7. Dishwashing room for a 100- to 150-bed hospital . . . . .	42		
8. Potwashing area for a 100- to 150-bed hospital . . . . .	44		

## EQUIPMENT LISTS

<i>Areas</i>	<i>Page</i>	<i>Areas</i>	<i>Page</i>
Receiving . . . . .	15	Potwashing . . . . .	44
Storage . . . . .	19	Housekeeping—Operations and Maintenance. . . . .	46
Food Production . . . . .	25	Ice-making . . . . .	50
Tray Setup, Serving, and Distribution . . . . .	30	Office . . . . .	51
Cafeteria—Dining . . . . .	34	Personnel Facilities . . . . .	53
Dishwashing . . . . .	41	Movable—Minor Equipment . . . . .	64



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## Planning Considerations

Good dietary service based on the application of optimum nutritional requirements contributes significantly to the care and recovery of patients and to the well-being of personnel. In addition to the obvious function of providing for the nutritional needs, such a dietary service program is an adjunct to therapy. Further, it is an element in the hospital's public relations program which may influence morale and patient and staff attitudes.

Coordination of the dietary service with the total hospital operations is the dual responsibility of the hospital administrator and the dietitian. To assure that the dietary service program conforms to the framework of the overall program, the administrator and dietitian must provide guidelines covering the following items:

1. The governing body's philosophy of administration and patient care, outlining specific contributions for each department.
2. Policies defining the operation of each hospital department and its relation with other departments.

3. Administrative procedures for the department including supervisory and personnel responsibilities.

4. Policies and procedures for major dietary functions including purchasing, inspection of food or subsistence, deliveries, menu planning, modified diet service, controlled food production, food distribution and service to patient and personnel, cost and catering, cost control and accounting, inventory control, sanitation, and inservice training program.

5. Conferences and/or committees to discuss inter-departmental relationships, coordination with all services, and the improvement of patient care.

Within these broad policies and procedures, the director of the dietary department undertakes the major responsibility for planning, organizing, operating, and contracting the dietary service. Basic assumptions must be formulated and a number of questions answered preparatory to developing an operating program and the procedures to be followed.

### PLANNING GROUP RESPONSIBILITIES

Major responsibilities of the dietary service planning group are: (1) develop a written program; (2) formulate planning assumptions; (3) select basic planning principles; (4) estimate staffing requirements; (5) carry out appropriate planning procedures; and (6) prepare a checklist of planning factors.

Those constituting the planning group may vary under different circumstances, but in general they include building committee members, the administrator, the dietitian, the architect, and the engineers.

From the outset, the dietitian, an integral part of the planning group, should be directly involved in planning or counseling as to location, arrangement, selection of equipment, and space requirements for the

equipment needed. This will include equipment for receiving and storage, food production, tray serving and distribution, personnel and patient dining, dishwashing, and ancillary food services. If the hospital does not employ a dietitian, the services of a professionally qualified dietary consultant should be enlisted to assist the planning committee.

The planning group will be responsible for determining the location of the dietary facilities. Location should be made above grade level to eliminate drainage problems and to assure adequate lighting, ventilation, and space. The group also determines, among other things, the amount of space required for serving patient care units and for receiving foods and supplies.



The dietitian should participate in all these decisions and should discuss the sanitary aspects of the dietary department with the architects and engineers. Sanitation considerations include ventilation; sewerage; toilet facilities; refrigeration; storage; interior finish material for walls, floors, and ceilings; and proper plumbing fixtures.

### *The Written Program*

The first step in planning the dietary service is to prepare a written program listing the major elements to be considered in setting up the department. This program is required in developing plans aimed at providing a maximum contribution to total patient care, and will be an invaluable aid to the architect and others responsible for planning the building program.

Basic information for the written program is collected and evaluated to aid in determining what type of service is required, who provides it, and where and how the service is performed. The cooperation of the planning committee is essential to the development of an effective written program. Items to be included are:

1. Goal of the dietary service.
2. Types and number of persons to be served.
3. Type of menu to be served and equipment required to prepare it.
4. Systems selected for serving patients.
5. Systems to be used for tray preparation and distribution.
6. Method to be used for infant feeding formula preparation.

7. Kinds of dining facilities to be provided for inpatients, personnel, and visitors.

8. Dishwashing system.

9. Handling and storage of food purchases.

10. Staffing and facility requirements for the dietary service operation.

### *Planning Assumptions and Related Factors*

The next step is to formulate basic planning assumptions around the points listed in the written program. Following are examples of planning assumptions and related factors used to prepare a program for hospitals with 225 beds or less. (These form the basis for calculations in this publication unless otherwise indicated.)

1. Overall goal of the dietary service is to provide nourishing and appetizing meals to all patients and personnel as efficiently and economically as possible.

2. The number of patient meals is based on average occupancy rate (e.g. 74.3 percent occupancy: 50 to 99 beds; 79.1 percent: 100 to 199 beds; and 82.8 percent: 200 to 299 beds). A ratio of full-time equivalent personnel per occupied bed is 2.0 for 50 to 99 beds, 2.3 for 100 to 199 beds, and 2.2 for 200 to 299 beds. An allowance is made of one meal per day for all personnel. Approximately 10 percent of the total number will be served breakfast, 50 percent lunch, and 40 percent dinner.

Visitors' meals are estimated on 20 percent of the patient load and are included in the lunch meal total. Interns, residents, students, and outpatients are excluded. An estimate of the total meals served daily in 50-, 100-, and 200-bed hospitals is shown in table 1. An interpolation of total meals for other bed sizes may be extracted from figure 1.

3. A selective 3-week cycle menu will be used for all patients, personnel, and visitors. A choice of entree, vegetable, salad, and dessert is included for noon and evening meals. (See planning factors on p. 6.)

4. A centralized system will be used for the patients' tray service.

5. An assembly line system will be used for the patients' tray setup. In this operation, centrally prepared trays are checked before being transported to patient care units in mobile tray conveyors or by a vertical tray carrier system. A dumbwaiter will be provided for handling special requests.

6. Infant feeding formula will be prepared in the nursery unit.

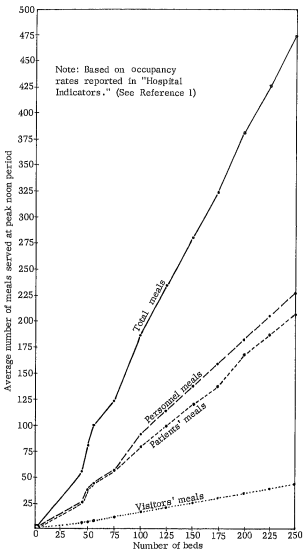


Figure 1. Average number of meals served in hospitals having up to 250 beds.

Table 1. Meals served daily in 50-, 100-, and 200-bed hospitals

Size of hospital	Number of persons			Number of meals						Total meals
(No. of beds)	Patients	Personnel	Visitors	Breakfast		Lunch		Dinner		
				Patients	Personnel	Patients	Personnel and Visitors	Patients	Personnel	
50	37	74	7	37	7	37	44	37	30	192
100	79	182	16	79	18	79	107	79	73	435
200	166	365	33	166	37	166	215	166	146	895

7. A cafeteria service will be available for ambulatory patients, personnel, and visitors. Three seatings instead of two will accommodate patients using the cafeteria.

8. Use centralized dishwashing system which meets the health standards for food establishments in the particular locale.

9. Term storage for refrigerated foods will be based on 7-day requirements, and dry storage needs will cover a 30-day period.

10. The number of dietary personnel required will be based on the type of service and total number of meals expected to be served daily. Layout and equipment will be considered in providing space for work areas, offices, toilets, and lavatory facilities.

## Planning Principles

Fundamental to all planning is the establishment of basic principles which may be used as guides to design and equip the dietary department. Observations of efficient dietary services and close examination of current literature indicate that the following guidelines are appropriate:

1. Work areas should be planned for each aspect of dietary service operation—receiving, storing, preparing, serving, warewashing, and cleaning. These can be considered separately or in combination since requirements vary with the size and functions of individual operations.

Workflow in the preparation and service of food should proceed in a direct line. This may be either straight or circular, but must be designed to accomplish work in the shortest time possible through receiving, storage, preparation, distribution, service, cleanup, and disposal of refuse. Smooth workflow is achieved within the proper space only if the necessary equipment is functionally arranged.

2. Workflow of the food service operation should provide a functional system with a minimum of crisscrossing and backtracking. Flow diagrams in proper sequence should indicate the steps involved in the movement of foods from receiving to storage, from storage to food preparation, then to the serving areas, and finally the return flow of materials and trays from the serving areas.

The flow method adapted from industry utilizes the assembly line concept for processing raw materials to finished products. This will result in better utilization of equipment, time, and space when applied to hospital dietary service activities.

3. The dietary department should be located convenient to the various areas within the department and those departments with which there is a relationship such as centralized services and patient care units.

4. Receiving and storage areas should be near the delivery entrance and the food production, preparation, and cleanup areas to facilitate food-handling operations.

5. The equipment in the preparation, cooking, and serving areas should be arranged so that personnel can perform tasks efficiently, economically, and without cross-traffic interference. Equipment positioned to achieve single direction workflow will increase work efficiency. Mobile food-holding units offer flexibility in serving areas. Island arrangements with equipment grouped around the worker will also facilitate work.

6. If possible, the tray distribution system should be designed around the central core of the hospital. Shafts for vertical transportation should be convenient to the tray serving line for fast delivery of trays to patient care units. Time and distance between the preparation point and the patient to be served must be considered. Maximum time from service to patient should be about 6 minutes.

7. The centralized tray service should be located near the preparation and cooking area to facilitate service. Mobile food storage units should be arranged at right angles to the serving line.

8. The cafeteria layout should be planned to help speed traffic flow and reduce labor. The food preparation area should be easily accessible to the serving lines. Storage space for empty trays from serving lines must also be provided.

9. Elevators should be accessible for patients permitted to use a general cafeteria or dining area on a different floor level.

10. Facilities for both clean and soiled dishwashing activities should be separated from other food service functions. However, the dishwashing area should be convenient to horizontal and vertical transportation for patient tray service and cafeteria.

11. Lounges and provision for personnel and visitors' coats should be near the dining facilities.

12. Office space for administrative and food production supervisory personnel should permit observation of food service operations.

13. Interior walls of all rooms used for food preparation, warewashing, and toilet facilities should have easily cleanable, smooth, and light-colored washable surfaces up to the highest level reached by splash or spray.

14. All floor surfaces should be of hard, smooth, nonabsorbent finished materials, and be easily cleaned. The intersection between floors and walls should be covered and sealed.

15. Finishes used in dietary service facilities create a high noise level which can be reduced by the use of acoustic surfaces for ceilings.

## Staffing Requirements

Staffing requirements should be based on the total number of meals expected to be served daily multiplied by the total labor time in minutes per meal which would be required to perform the major food service activities per tray. This pattern, recommended in several studies (2-5), is based on the assumption that dietary personnel work a 40-hour week. The time of the professional dietitian and clerical worker is not included.

Studies show a range of 17 to 21.4 minutes per meal for hospitals serving under 900 meals and 15 minutes to 19.3 minutes per meal for those serving over 900 meals. These factors vary according to the extent of dietary responsibilities and the standard of service demanded by the administrator (6).

To compute the total number of personnel positions, multiply the total labor-minutes per meal by the maximum number of meals served daily (7). This figure, when divided by 480 labor-minutes per person per day, will yield the number of positions required daily for serving the maximum number of meals. A 1.55 leave coverage requirement is used for personnel. This allows 7 holidays, 12 sick days, 15 days of vacation leave, and 2 days off a week. This 1.55 figure is multiplied by the number of positions to determine the total number of personnel required for a 7-day week schedule. The 1.55 adjustment factor varies with leave policies. For example, 8 holidays, 20 days of annual leave, and 9 days of sick leave for a full-time coverage 7 days a week with an 8-hour shift will be 1.63.

Based on the above method of calculation, the estimated total staffing for the dietary programs as presented herein would be:

Hospital size (No. of beds)	Meals served daily	Labor minutes per meal	Personnel on duty daily	Total personnel required*
50	192	20.7	8.28	13
100	435	20.7	18.75	29
200	866	19.5	35.00	56

\*Based on the number of positions multiplied by the 1.55 adjustment factor.

## Planning Procedures

After the dietary department program has been prepared and the principles outlined, the architect develops schematic drawings of the facility. These translate the information in the program in terms of area required, the interrelationship of the various areas, and the traffic flow between them. The dietitian and other members of the planning group should study these drawings carefully, and any revisions or changes should be incorporated into the plan at this time. Cost estimates are also prepared at this stage.

After the approval of schematic drawings and cost estimates, a departmental plan should be developed along with an outline specification indicating major equipment items. During this preliminary drawing stage, decisions must be reached regarding structural, mechanical, and electrical requirements. Major changes should not be made after these preliminary drawings and specifications have been approved.

Work drawings are made to scale so that, with the specifications, they convey to the contractor details pertaining to the construction of the building. These drawings and specifications are divided into the various components which make up the trades involved in the construction, equipment, and systems.

Other vitally important activities include soliciting bids, awarding the contract, constructing the facility, and obtaining major movable and small items of equipment not in the construction contract.

The time allotted to the planning stage will be amply repaid when, ultimately, a facility for an efficient dietary service operation is provided and needless expenses for changes during the construction period are reduced.

A checklist of planning factors should be prepared to aid the planning group to allocate space and review plans and equipment needed during the programming stage. It will also be of value as a final check for equipping each area of the hospital dietary facilities.

## PLANNING FACTORS

### GENERAL CONSIDERATIONS

- What will be the bed capacity? \_\_\_\_\_  
Specify number of:  
floors \_\_\_\_\_ patient care units on each floor \_\_\_\_\_ beds on each patient care unit \_\_\_\_\_ buildings served \_\_\_\_\_
- Who will be responsible for the dietary service?  
hospital administrative dietitian \_\_\_\_\_ hospital food manager \_\_\_\_\_ food management services (nonhospital) \_\_\_\_\_
- What type of menu will be provided?  
selective cycle \_\_\_\_\_ nonselective cycle \_\_\_\_\_
- What dietary functions, other than food production, will be centralized?  
patient tray service \_\_\_\_\_ cafeteria \_\_\_\_\_ dishwashing \_\_\_\_\_
- What will be the estimated number of meals to be served daily?

	Breakfast	Lunch	Dinner	Other
a. Patient.....	_____	_____	_____	_____
b. Personnel.....	_____	_____	_____	_____
c. Public, outpatient, visitor.....	_____	_____	_____	_____

### RECEIVING ENTRANCE

- What type of scale will be located near the loading dock?  
automatic indicating \_\_\_\_\_ platform beam \_\_\_\_\_ floor model \_\_\_\_\_ table \_\_\_\_\_
- What will be used to hold invoices while checking incoming food deliveries?  
counter \_\_\_\_\_ stand-up desk \_\_\_\_\_ shelf \_\_\_\_\_
- How will deliveries be transported to storage areas? hand trucks \_\_\_\_\_ pallets \_\_\_\_\_
- How many trucks will require storage space? one \_\_\_\_\_ two \_\_\_\_\_ four \_\_\_\_\_
- If storage facilities are not located on receiving entrance level, will deliveries be conveyed to storage by:  
elevator \_\_\_\_\_ dumbwaiter \_\_\_\_\_ reversible belt conveyor \_\_\_\_\_
- Where will handwashing facilities be located? \_\_\_\_\_  
Will one such facility be convenient to receiving entrance? \_\_\_\_\_
- Will trash storage and food delivery areas be divided by separate platforms?  
a. Are the above areas located convenient to:  
food production \_\_\_\_\_ dishwashing \_\_\_\_\_ receiving \_\_\_\_\_  
b. Will the janitor's closet be located convenient to:  
trash storage \_\_\_\_\_ food production \_\_\_\_\_



# STORAGE, REFRIGERATED, DRY, NONFOODS, AND HOUSEKEEPING AREAS

- Will refrigerated space be planned for meat purchases in: wholesale cuts \_\_\_\_\_ quarters \_\_\_\_\_ portion controlled \_\_\_\_\_ chilled \_\_\_\_\_ frozen \_\_\_\_\_
- Will portion-controlled fish and poultry items require:  
chill space \_\_\_\_\_ freeze space \_\_\_\_\_ dry storage \_\_\_\_\_
- Will refrigeration space be designed to accommodate:  
mobile racks \_\_\_\_\_ carts \_\_\_\_\_ modular pans \_\_\_\_\_
- What type of refrigerator shelving will be used: removable \_\_\_\_\_ portable \_\_\_\_\_
- Will refrigerated storage facilities for fruits and vegetables be based on items purchased as:  
fresh, partially cleaned \_\_\_\_\_ frozen \_\_\_\_\_
- Will space requirements for all perishable items be based on deliveries:  
daily \_\_\_\_\_ weekly \_\_\_\_\_ biweekly \_\_\_\_\_ other (specify) \_\_\_\_\_
- What type of frozen food storage cabinets will be used:  
reach-in \_\_\_\_\_ walk-in \_\_\_\_\_ combination \_\_\_\_\_
- What type of refrigerators will be used:  
reach-in \_\_\_\_\_ walk-in \_\_\_\_\_ combination \_\_\_\_\_
- Where will the refrigerator for produce be located?  
adjacent to salad preparation area \_\_\_\_\_ adjacent to the receiving entrance \_\_\_\_\_
- Will the meat refrigerator, frozen food storage, dairy refrigerator, and dry (day) storage facilities be adjacent to: receiving entrance \_\_\_\_\_ other (specify) \_\_\_\_\_  
be convenient to: cooking \_\_\_\_\_ baking \_\_\_\_\_
- Specify number and capacity (cubic feet) of refrigerated facilities to be used in such areas as:

## Refrigeration Storage Units

Area	Normal temperature (35° F.-40° F.)		Zero temperature (0° F.-10° F.)	
	Number	Capacity (cu. ft.)	Number	Capacity (cu. ft.)
a. Baking—desserts.....	_____	_____	_____	_____
b. Cooking.....	_____	_____	_____	_____
c. Salad-making.....	_____	_____	_____	_____
d. Serving.....	_____	_____	_____	_____
e. Frozen desserts.....	_____	_____	_____	_____

- Specify type, number, and capacity of refrigerated facilities.

## Refrigeration Storage Units

Types of Refrigerators	Normal temperature (35° F.-40° F.)		Zero temperature (0° F.-10° F.)	
	Number	Capacity (cu. ft.)	Number	Capacity (cu. ft.)
Upright cabinets:				
Reach-in.....	_____	_____	_____	_____
Pass-through.....	_____	_____	_____	_____
Under counter:				
Reach-in.....	_____	_____	_____	_____
Pass-through.....	_____	_____	_____	_____
Walk-in:				
Built-in.....	_____	_____	_____	_____
Freestanding.....	_____	_____	_____	_____

- What provision will be made for day storage? \_\_\_\_\_
- Where will storage be provided for bread and other bakery products?  
preparation area \_\_\_\_\_ day storage \_\_\_\_\_

15. Has shelving in all storage areas been planned according to floor clearance specified by local health department? \_\_\_\_\_
16. Which of the following items of equipment will be used in the dry storage area?  
 adjustable shelving \_\_\_\_\_ trucks \_\_\_\_\_ portable bins and cans \_\_\_\_\_ counter scale \_\_\_\_\_  
 pallets \_\_\_\_\_ cabinet \_\_\_\_\_
17. Will adequate, convenient, and separate storage facilities be provided for the following areas?  
 refrigerated food waste \_\_\_\_\_ trash \_\_\_\_\_ housekeeping equipment \_\_\_\_\_  
 single service supplies \_\_\_\_\_ nonfood supplies (harmful or poisonous) \_\_\_\_\_

## FOOD PRODUCTION AREA

1. Which items of equipment are needed in the food production areas?
- a. Meat and modified diet and nourishment preparation areas:  
 cans for bones and trimmings \_\_\_\_\_ electric meat slicer \_\_\_\_\_ table, cutting board (plastic) \_\_\_\_\_ sink, drainboards \_\_\_\_\_ other (specify) \_\_\_\_\_
- b. Vegetables—salads—cold foods:  
 food cart or truck \_\_\_\_\_ refrigerator—food pan file, mobile \_\_\_\_\_ sink, drainboards \_\_\_\_\_ table \_\_\_\_\_ trash or waste cans \_\_\_\_\_ vegetable peeler \_\_\_\_\_  
 food waste disposer \_\_\_\_\_ food chopper, cutter, or slicer \_\_\_\_\_ lavatory \_\_\_\_\_ mixer and attachments \_\_\_\_\_
- c. Cooking—baking:  
 lavatory \_\_\_\_\_ roll divider \_\_\_\_\_ proof box \_\_\_\_\_ baker's bins \_\_\_\_\_  
 baker's racks, portable \_\_\_\_\_ baker's scale \_\_\_\_\_ broiler \_\_\_\_\_ oven \_\_\_\_\_  
 cabinet \_\_\_\_\_ deep fat fryer \_\_\_\_\_ food mixer \_\_\_\_\_ range top \_\_\_\_\_ spreader plate \_\_\_\_\_ hood \_\_\_\_\_ ventilating fan \_\_\_\_\_ removable grease filters \_\_\_\_\_  
 refrigerator \_\_\_\_\_ sink with drainboards \_\_\_\_\_ steamer \_\_\_\_\_  
 steam jacketed kettle \_\_\_\_\_ extinguisher system for grease fires in hoods and ducts \_\_\_\_\_
- (1) Will steam jacketed kettles, food steamer, and mixer be conveniently arranged for vegetable preparation? Specify: \_\_\_\_\_
- (2) How will the hot food preparation area be arranged to serve the hot food setup for:  
 patient trays \_\_\_\_\_ personnel cafeteria \_\_\_\_\_
- (3) Specify the location of the nourishment area in relation to:  
 storage area \_\_\_\_\_ dietitian's office \_\_\_\_\_
- (4) If bakery is maintained, will space be provided for preparation of the following items daily?  
 hot breads \_\_\_\_\_ pastries \_\_\_\_\_ baked desserts \_\_\_\_\_  
 other (specify) \_\_\_\_\_
- (5) Where will pre-mixes (if used) be stored? \_\_\_\_\_
- (6) Will the base of the baker's table allow for storing portable ingredient bins? \_\_\_\_\_
- (7) Will shelf space be provided above the table for spice containers? \_\_\_\_\_
- (8) What type of equipment will be used to transport bakery/dessert items to the serving areas? \_\_\_\_\_

## SERVING AREA—CENTRALIZED PATIENT TRAY SERVICE

1. What type of serving table will be used for the assembly of patient trays?  
 fixed \_\_\_\_\_ mobile \_\_\_\_\_
- a. Specify if the serving table is to be equipped with:  
 Conveyor belt \_\_\_\_\_ electrical outlets \_\_\_\_\_  
 shelf for heating and storing plate covers \_\_\_\_\_

- b. What type of mobile equipment will be used for holding and storing trays?  
self-leveling dispenser \_\_\_\_\_ dolly \_\_\_\_\_ shelving \_\_\_\_\_
- c. How many hot food units, table type with interchangeable inserts, will be needed for serving:  
regular diets \_\_\_\_\_ modified diets \_\_\_\_\_
- d. What type of dispensers will be used for storing the following dishes?  
plates \_\_\_\_\_ bowls \_\_\_\_\_ vegetable dishes \_\_\_\_\_ cups \_\_\_\_\_  
plate covers \_\_\_\_\_
- (1) If dispensers for heating dishes are not thermostatically controlled, specify the type of equipment to be used for preheating dishes: \_\_\_\_\_
- e. How many cold food units, table-type, will be needed for serving:  
regular diets \_\_\_\_\_ modified diets \_\_\_\_\_
- f. Specify types, number and capacity of refrigerated facilities needed on or near the "cold food line" for storing salads, ice cream, and frozen desserts.

### REFRIGERATION STORAGE UNITS

Types of Refrigerators	Normal temperature (38° F.-46° F.)		Zero temperature (0° F.-10° F.)	
	Number	Capacity (cu. ft.)	Number	Capacity (cu. ft.)
Mobile cabinet.....	_____	_____	_____	_____
Pass-through.....	_____	_____	_____	_____
Reach-in.....	_____	_____	_____	_____

- g. How will hot beverages be prepared?
- | Beverage        | Automatic<br>beverage<br>maker | Automatic<br>Urn | Vacuum<br>coffee<br>maker |
|-----------------|--------------------------------|------------------|---------------------------|
| Chocolate ..... | _____                          | _____            | _____                     |
| Coffee .....    | _____                          | _____            | _____                     |
| Tea .....       | _____                          | _____            | _____                     |
- h. If instant beverages are used, how will boiling water be provided?  
thermal beverage pot \_\_\_\_\_ other (specify) \_\_\_\_\_
- i. How and where will "pre-set" tray items (breads, jellies, packaged condiments, and flatware) be stored?  
cabinet \_\_\_\_\_ shelves \_\_\_\_\_ table \_\_\_\_\_ tray setup line \_\_\_\_\_  
other (specify) \_\_\_\_\_
- j. Specify which of the following equipment items are to be located near the serving line:

Item	Number	Capacity
Blender.....	_____	_____
Automatic egg cooker.....	_____	_____
Griddle.....	_____	_____
Toaster.....	_____	_____
Malt mixer.....	_____	_____
Microwave oven to defrost and heat frozen items.....	_____	_____
Portion/dietetic scale.....	_____	_____
Electronic trunnion kettle for speed cooking.....	_____	_____
Other (specify).....	_____	_____

- k. Where will the automatic self-dispensing icemaking machines be located?  
cafeteria area \_\_\_\_\_ salad area \_\_\_\_\_ tray-serving area \_\_\_\_\_

## TRAY DISTRIBUTION

1. How will trays be transported to patient care units?  
 separate elevator \_\_\_\_\_ vertical tray carrier \_\_\_\_\_ floor-level dumbwaiter \_\_\_\_\_  
 wall-type dumbwaiter \_\_\_\_\_ mobile tray conveyor \_\_\_\_\_
2. Will the transportation system be conveniently located to all patients' rooms? \_\_\_\_\_
  - a. Will the transportation system open directly into:  
 separate alcove \_\_\_\_\_ dietary facility \_\_\_\_\_
  - b. Specify type and capacity of mobile tray conveyors.
 

Type of mobile tray conveyor	Tray capacity
dual-control .....	_____
unheated .....	_____
custom-fabricated .....	_____

    - (1) If unheated tray conveyor is used, how will the proper temperature of the following foods be maintained?  
 hot foods \_\_\_\_\_ cold foods \_\_\_\_\_ frozen foods \_\_\_\_\_
    - (2) Specify storage area for mobile tray conveyors \_\_\_\_\_
  - c. How will mobile tray conveyors and serving units be sanitized?  
 a spray-type germicidal detergent \_\_\_\_\_ other (specify) \_\_\_\_\_

## CAFETERIA—DINING

1. Has cafeteria been planned around specific serving hours: \_\_\_\_\_
2. What type of general feeding facilities are provided?
 

	Patients	Personnel	Visitors
Cafeteria-dining room .....	_____	_____	_____
Snack bar .....	_____	_____	_____
Vending-device operation .....	_____	_____	_____
3. Specify the number of seats needed in the cafeteria \_\_\_\_\_
  - a. Will there be separate facilities for: banquets \_\_\_\_\_ meetings \_\_\_\_\_ training programs \_\_\_\_\_
4. Is cafeteria service available for all meals to:  
 ambulatory patients \_\_\_\_\_ personnel \_\_\_\_\_ visitors \_\_\_\_\_
5. Is the cafeteria location accessible for: inpatients \_\_\_\_\_ outpatients \_\_\_\_\_
6. If patients are to use the cafeteria, specify how modified diets will be served \_\_\_\_\_
7. Will cafeteria line be designed and arranged for service as:  
 hollow square \_\_\_\_\_ straight line \_\_\_\_\_ combination \_\_\_\_\_ vending operation \_\_\_\_\_
8. How many serving lines will be required? \_\_\_\_\_
9. How many persons will be expected to be served? \_\_\_\_\_
10. Is a separate line needed for preparing sandwiches and grill items? \_\_\_\_\_
11. Where will the cashier's counter be located? \_\_\_\_\_ end of serving line \_\_\_\_\_ cafeteria exit \_\_\_\_\_
12. Will a lavatory be provided back of the cafeteria serving counter? \_\_\_\_\_
13. What type of counter table will be used for serving hot foods?  
 waterless \_\_\_\_\_ gas \_\_\_\_\_ electric \_\_\_\_\_ steam \_\_\_\_\_
14. If "cold pans" are used for displaying desserts, salads, and other cold items, how are they cooled?  
 ice filled \_\_\_\_\_ mechanically cooled \_\_\_\_\_
15. How will the counter be arranged for beverage service?
 

	Chocolate	Coffee	Ice	Milk	Iced tea/cold beverages
Counter service .....	_____	_____	_____	_____	_____
Self service .....	_____	_____	_____	_____	_____

16. Where will cups be stored? \_\_\_\_\_
17. How will glasses be stored near the water cooler? racks on dollies \_\_\_\_\_ dispenser \_\_\_\_\_
18. How will ice cream be sold in cafeteria? portioned \_\_\_\_\_ hand dipped \_\_\_\_\_
19. Where are condiments to be located? service island \_\_\_\_\_ cafeteria tables \_\_\_\_\_
  - a. Who will bus trays? diners \_\_\_\_\_ dietary personnel \_\_\_\_\_
20. Where will clean tableware be located? service island \_\_\_\_\_ serving line \_\_\_\_\_
21. Will the following facilities be located near the cafeteria? Lavatories \_\_\_\_\_ toilets \_\_\_\_\_ coat checkroom \_\_\_\_\_

### DISHWASHING AREA

1. Will dishwashing room be enclosed? \_\_\_\_\_
2. Will the separate area for clean activities be: open \_\_\_\_\_ enclosed \_\_\_\_\_
3. What method will be used to return soiled trays?

Method	Patient care unit	Cafeteria
Cart .....	_____	_____
Mobile conveyor .....	_____	_____
Horizontal belt .....	_____	_____
Vertical tray-carrier system .....	_____	_____

- a. In addition to the dishwashing machine, will the following equipment be used?
  - soak sink \_\_\_\_\_ prerinse sink \_\_\_\_\_ waste disposer unit \_\_\_\_\_
- b. Will the location of the central dishroom be convenient to handle tableware from:
  - patient tray service \_\_\_\_\_ cafeteria service \_\_\_\_\_
4. How will flatware be sorted, washed, and sanitized?
  - flat rack \_\_\_\_\_ cylinder \_\_\_\_\_ compartment baskets \_\_\_\_\_

### POTWASHING AREA

1. Which of the following items of equipment will be used in the potwashing area?
  - washer-sink with built-in pump \_\_\_\_\_ mechanical brush \_\_\_\_\_ mechanically operated pot-washer \_\_\_\_\_ two drainables with drainboards \_\_\_\_\_ three-compartment sink with washing unit \_\_\_\_\_ waste disposer \_\_\_\_\_ lavatory \_\_\_\_\_ portable pot racks \_\_\_\_\_
2. How will 180° F. rinse water be thermostatically controlled in sanitizing compartment of pot sink?
  - booster heater \_\_\_\_\_ steam injector, if State code permits \_\_\_\_\_
3. How much space is required for storage of soiled utensils and wares? \_\_\_\_\_
4. Specify depth and size of sinks for washing and rinsing wares. \_\_\_\_\_

### HOUSEKEEPING—OPERATIONS AND MAINTENANCE

1. Will the following equipment items be used for maintaining sanitary conditions for the dietary department only within the following areas?
  - a. Can washing area:
    - can washer \_\_\_\_\_ pedestal type \_\_\_\_\_ floor drain type \_\_\_\_\_ can rack \_\_\_\_\_
    - G.I. cans with covers \_\_\_\_\_ refrigerated storage for trash and waste containers \_\_\_\_\_
  - b. Trash area:
    - shelves \_\_\_\_\_ can and bottle crusher \_\_\_\_\_ G.I. cans \_\_\_\_\_
  - c. Mop and scrubbing equipment:
    - wet-dry vacuum cleaner \_\_\_\_\_ floor scrubbing and polishing \_\_\_\_\_
    - mop and bucket \_\_\_\_\_ stool or folding stepladder (safety type) \_\_\_\_\_

- d. Janitor's area:  
 elevated shelves \_\_\_\_\_ scrub bucket \_\_\_\_\_ floor-type sink \_\_\_\_\_  
 clamps for mop handles \_\_\_\_\_
- e. Soiled and clean linen:  
 carts for storing clean linen \_\_\_\_\_ cabinets for storing clean uniforms \_\_\_\_\_  
 hampers for soiled linen \_\_\_\_\_

## PATIENT CARE FLOORS

- If a progressive patient care program is planned, what equipment will be used to serve trays in day-dining rooms?  
 mobile cafeteria \_\_\_\_\_ mobile tray conveyor \_\_\_\_\_
- If dietary facilities are provided on patient care floors, will they be used for:  
 housing ice machines \_\_\_\_\_ icing water carafes \_\_\_\_\_ preparing feedings \_\_\_\_\_  
 storing nourishments \_\_\_\_\_ storing small tray carts \_\_\_\_\_ holding deferred trays \_\_\_\_\_
- Will drinking glasses and water carafes or stainless steel tops to disposable ones be sanitized in the central dishwashing room? \_\_\_\_\_
- Specify what provision is to be made for waste disposal. \_\_\_\_\_
- Who will serve:

	dietary	Personnel nursing
patient's tray .....	_____	_____
drinking water .....	_____	_____
nourishment .....	_____	_____

## EDUCATION

- Specify what facilities are needed for teaching:  

	Classroom	Nutrition clinic
staff (medical, nursing, and others) .....	_____	_____
students (dietetic interns, nursing) .....	_____	_____
inpatients and outpatients .....	_____	_____
dietary personnel .....	_____	_____
- What equipment will be needed for teaching programs?  
 bulletin boards \_\_\_\_\_ chalk boards \_\_\_\_\_ projectors \_\_\_\_\_ teaching machines \_\_\_\_\_  
 other (specify) \_\_\_\_\_
- Specify location of facilities required for performing special research studies:  
 patient care floor \_\_\_\_\_ special wing \_\_\_\_\_ other (specify) \_\_\_\_\_

## PERSONNEL

- How many employees will staff the dietary department?  
 baker \_\_\_\_\_ cook \_\_\_\_\_ clerical \_\_\_\_\_ dietitians \_\_\_\_\_ food manager \_\_\_\_\_  
 food service supervisor \_\_\_\_\_ food service worker \_\_\_\_\_
- What facilities are provided for dietary personnel?  
 toilets \_\_\_\_\_ showers \_\_\_\_\_ lockers \_\_\_\_\_ lounge \_\_\_\_\_ office \_\_\_\_\_

## OFFICE

1. Will the dietitian's office be readily accessible to other disciplines?  
medical \_\_\_\_\_ nursing \_\_\_\_\_ administration \_\_\_\_\_
  2. Will the following equipment items be needed in the dietitian's office?  
bookcase \_\_\_\_\_ lamp \_\_\_\_\_ pneumatic tube \_\_\_\_\_ table \_\_\_\_\_ desk \_\_\_\_\_  
typewriter \_\_\_\_\_ adding machine \_\_\_\_\_ telephone \_\_\_\_\_ intercom system \_\_\_\_\_  
file cabinets: card size \_\_\_\_\_ letter size \_\_\_\_\_ chairs: straight \_\_\_\_\_ swivel \_\_\_\_\_  
large bulletin board for educational material \_\_\_\_\_
  3. What special equipment is needed if food costing function is performed within the dietary department? \_\_\_\_\_
  4. Will the office in food production be provided with glass paneling to observe food service activities? \_\_\_\_\_
-

## Planning Individual Areas

The planning recommendations in this guide are based on standards and practices which have been demonstrated successfully in a representative number of hospitals.

Methods of operation and equipment selection will vary with the design of the hospital, type of menu, tray distribution, and many other factors. Thus,

optional methods, systems, equipment, and space requirements have been included for consideration in planning the individual areas where functions common to all hospital dietary service operations are performed.

Examples of overall layouts are shown in figures 12-14 in chapter VI. Layouts illustrating major functions follow the equipment lists.

### RECEIVING

A loading platform and a receiving area are required to provide temporary storage during the delivery check. These facilities should be planned according to the types and volumes of materials to be received and the delivery service schedule (8).

**Function and Location.** The loading platform, which will be used for unloading deliveries, should be located at an outside entrance to serve all delivery traffic and should also be convenient to daily food storage.

The receiving entrance, which may serve as a vestibule, usually adjoins the loading platform and is located close to storage areas. It should be separate from the food production area and the storeroom. (See fig. 2.) Foods and supplies are checked and weighed in this area.

**Operational Aspects.** The receiving operation provides for minimal handling of all bulky and heavy foods. If possible, foods should be delivered to storage or the work center directly after checking.

If storage facilities are located below the receiving level, package slides will facilitate handling.

**Space Requirements.** The space required for the loading platform will vary with the volume of deliveries and number of trucks to be parked in the area at one time. For example, the minimum space requirement for a dock to accommodate a delivery truck is approxi-

mately 8 feet wide and 10 to 12 feet long. If powered or hand-operated material handling equipment is used, the dock width should be between 12 and 15 feet. A 20-foot allowance should be planned if two trucks are to unload simultaneously.

The receiving entrance provides space for each shipment received, the persons who are weighing and inspecting it, and the equipment required for the operation. In larger hospitals, additional space is provided if mobile carts and pallets are used for handling materials in storage.

Space must be planned for the receiving office and other areas and equipment located near the receiving entrance. A waste disposal unit is necessary only if vegetables are to be processed. A vegetable preparation area could be incorporated in the receiving and storage plan if desired.

**Design Considerations.** The following design features are suggested:

(a) A roof should be planned over the entire platform, projecting 2 feet beyond it to afford maximum weather protection and high enough to clear the average delivery truck; 14 feet above grade is usually recommended. The height of the raised platform should correspond with that of a normal truck bed. Adjustable panels are available for installation in loading docks to accommodate different truck heights.



(b) Steps and/or ramp with a handrail should be provided at one end of the platform. The increasing use of containerized trash removal will warrant an increase in minimal dock lengths.

(c) Door openings are planned to allow easy passage of supplies and equipment; 3¼ to 5 feet are considered standard widths for single and double doors.

**Equipment Arrangement.** Scales should be located in the line of flow from receiving to storage. A table on casters or a drop shelf placed near the scales will provide a convenient place to hold small items until transferred to storage. When not in use, the table may be stored in the receiving entrance. A counter, stand-up desk, or shelf placed near the scales assists in speeding the operation. A platform truck, skids, and/or pallets will be required to transport supplies to storage areas. They may be stored in or near the receiving entrance when not in use. A lavatory should be near the area.

**Equipment List.** An equipment list for the receiving entrance is presented. The classification of equipment is explained in the appendix.

	<i>Suggested quantity</i>		
	<i>Number of beds</i>		
	50-75	100-150	200-225
	A*	B†	C‡
RECEIVING.....	1	1	1
<i>Fixed Equipment</i>			
Counter, standup desk or shelf, 21 inches long, 18 inches wide, 42 to 46 inches high.....	1	1	1
<i>Movable-Major Equipment</i>			
Scale, platform, portable, beam type, 1,000-lb. with 8-ounce graduation.....	1	1	1
Stool, adjustable with back, 22 to 33 inches.....	1	1	1
Table, utility, 1 undershelf, lock- ing casters, 30 x 24 inches....	1	1	1
Truck, platform, 4 wheels, 48 inches long, 24 inches wide, 12 to 14 inches high.....	1	1	1

\*A—60 to 125 meals at peak (noon) period.

†B—180 to 280 meals at peak (noon) period.

‡C—380 to 430 meals at peak (noon) period.

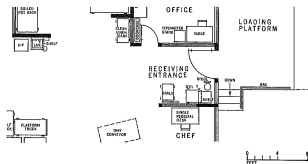


Figure 2. Receiving entrance for a 100- to 150-bed hospital.

## STORAGE

Storage requirements will depend on the quantity of foods to be stored at one time, the type of service and menu provided, the frequency of deliveries, and the proximity of the hospital to the food supply.

The types of storage needed will be based on the kind of items to be stored. Separate refrigerated storage is provided for meat and poultry, dairy products, fresh fruits and vegetables, frozen products, and ice cream.

Maximum temperature for storage of all perishable foods is 40° F. (9). See table 2 for a listing of temperature and humidity requirements for other foods.

Table 2. Temperature and humidity requirements for storing perishable foods

Perishable foods	Temperature (°F.)	Relative humidity (percent)
Meat and poultry.....	32-36	85-90
Dairy.....	33-40	80-85
Fruits and vegetables.....	34-49	80-95
Frozen products.....	-10- 0	
Ice cream.....	-5- 0	

**Estimating Food Requirements.** For the purpose of this guide, the estimated food requirements presented in table 3 are based on the assumption that approximately 6 pounds gross weight of food per day will provide each person with an adequate diet. The food percentages shown are based on specific purchasing practices and vary according to individual opera-

tion. For example, approximately 77 percent (4.671 lbs.) of the total amount of food purchased requires either freeze or chill storage space, and the remaining 23 percent requires dry storage space.

Based on these purchasing practices, tentative refrigeration requirements for term storage indicate that 41 percent of the space is required for frozen foods and 59 percent is needed for chilling purposes.

As more processed and frozen foods are used instead of fresh, the need for freeze space increases and that for chill space decreases.

**Term Storage Requirements.** Foods for storage are packed and purchased in many different ways and in various forms. This should be considered in estimating the space requirements. For example, certain foods are purchased in the following form: bread, sliced; ice cream, cup or brick portions; meat, portion-control cuts and oven-ready roasts; fruits and vegetables, frozen.

The schedule for delivery will be:

Fresh and frozen meats and produce . . . . . biweekly.  
Milk and bread . . . . . daily.  
Ice cream . . . . . biweekly.  
Canned goods . . . . . monthly.

Total requirements for term storage cited in tables 4-6 are estimated for a 7-day supply of frozen and chilled foods, 30 days for dry storage, and for 3½ days of day storage. Additional food storage may need to be considered for emergencies.

To simplify the estimate for preliminary planning shown in tables 4-6, the number of total meals is based

Table 3. Daily food requirements per person

Food groups	Pounds per person	Freeze (percent)	Chill (percent)	Dry (percent)
Meat, fish, poultry, cheese.....	1.082	60	30	10
Milk, cream, ice cream, eggs.....	2.117	10	80	10
Butter, margarine, bacon, other fats.....	.136		90	10
Fruits and vegetables.....	1.961	55	30	15
Breads and cereals.....	.428			100
Miscellaneous.....	.302			100
Total pounds.....	6.028			

Note: The above food allowances are expressed in pounds of food per person per day on an "as purchased" basis.

on 100 percent bed occupancy, an estimated 20 percent of the patient load for visitors, and an average ratio of full-time equivalent personnel per bed (i.e., a ratio of 1.3 personnel per bed for 50 beds; 1.6 for 100 beds; and 1.7 for 200 beds). These estimates will satisfy term-storage requirements for 100 percent bed occupancy.

Approximately 25 pounds of food have been estimated to occupy 1 cubic foot of actual storage space. This figure represents only the average pounds per cubic foot of goods in packages and cases and excludes aisle space. Total cubic feet represents the actual requirements specified for the various kinds of storage in tables 4-6.

Table 4. Refrigerated storage for 7 days

Hospital size (number of beds)	Number of meals per day	Number of persons	Weight (lbs.)	Total cubic feet
Standard	3	1	33	1.3
50	225	75	2,475	99.0
100	490	160	5,280	211.2
200	981	327	10,791	432.0

Table 5. Dry storage for 30 days

Hospital size (number of beds)	Number of meals per day	Number of persons	Weight (lbs.)	Total cubic feet
Standard	3	1	41	1.6
50	225	75	3,075	123.0
100	490	160	6,560	262.0
200	981	327	13,407	536.2

Table 6. Day storage for 3½ days

Hospital size (number of beds)	Number of meals per day	Number of persons	Weight (lbs.)	Total cubic feet
Standard	3	1	5	.20
50	225	75	375	15.0
100	490	160	800	32.0
200	981	327	1,635	65.4

**Nonterm Storage Requirements.** In addition to determining needs for refrigerated "term" storage, requirements must be estimated for "nonterm" storage of foods prepared and stored for the daily meal. Reach-in refrigerators and frozen food storage cabinets are required for this purpose.

Approximately ½ cubic foot of reach-in refrigerator space should be allowed per person per day plus 1 to ½ cubic foot for frozen food storage.

**Walk-in Refrigerators.** The decision to "build-in" walk-in refrigerators for zero and nonterm storage depends on individual hospital policies. Freestanding, fabricated modular sections are preferable as these commercial types will not limit future remodeling of storage facilities and will thus facilitate future building expansion (10).

Factors to consider in planning walk-in refrigerators include:

1. Allow approximately 18 square feet for each door made unusable by door swing.
2. Allow an average of 1 cubic foot of storage space for 25 pounds of stacked, cased foods.
3. Plan a minimum of 3 feet for aisle space.
4. Measure all types of walk-in refrigerators according to height. Standard height is 7 feet 6 inches. Outside measurements may range from 8 feet 6 inches. Inside measurements of an 8- by 8-foot walk-in refrigerator are 7 feet square.
5. Locate air-cooled compressors for refrigerators in an area other than dry storage space. Adequate ventilation should be provided. Water-cooled compressors require adequate water supply and careful ventilation problems.
6. If floor drains are provided within walk-in refrigerators, drains should not be directly connected to any drainage system.
7. Equip all walk-in refrigerators with safety devices such as lock-in alarms and high-temperature alarms.
8. Make refrigerator flooring flush with the outside area to accommodate mobile equipment holding floors.
9. Provide access to all mechanical equipment to assure proper maintenance.
10. Equip walk-in refrigerators with remote thermometers to indicate inside temperatures. Label thermometer for easy observation.

**Reach-in Refrigerators.** Where "portion control" serving methods have been established, reach-in refrigerators are planned to meet all the storage needs for the dietary operation. When total capacity exceeds 60 cubic feet, a reach-in walk-in combination refrigerator may be considered (11).

Reach-in refrigerators are located in the preparation, bake, cook, salad, serving, and other work areas as needed for storage.

If refrigerators are located in traffic aisles, full-length sliding doors are more convenient than swingout doors. Units which may be used in combination



tion are normal and zero sections. Both floor and undercounter models are available. Units may be fixed or mobile with front opening or pass-through doors. Food file and rollout shelving with baskets provide flexibility. Extra heavy-duty door hinges and closing mechanisms must be specified in the initial selection.

Reach-in refrigerators are available in one to four sections with one or two doors per section. One section, for example, 25 cubic feet net, will provide 24.3 square feet of net usable shelf space and will occupy approximately 9 square feet of floorspace.

In planning refrigerator space for portion-controlled items, the number and types of items will dictate the amount which can be stored per section. (See fig. 3.)

**Central Storage.** A locked area within the central storeroom is allocated for dry storage term needs, nonperishable food items, and other dietary supplies. Estimated requirements for a 30-day supply of dry foods are shown in table 5.

If central stores are located on a different level from receiving, refrigeration and vertical transportation will need to be considered.

**Day Storage.** Storage facilities for daily supplies are provided near the baking and cooking sections. A minimum of 3½ days storage is planned. The estimated requirements are shown in table 6.

**Nonfood Storage.** A separate room near the receiving area and convenient to the food production, dishwashing, and housekeeping areas should be provided for storing nonfood items such as cleaning supplies, paper goods, and surplus dishes. These should be stored so as to prevent contamination from cleaning operations. In larger installations, these facilities may also provide storage for small equipment items that are used less frequently. Cleaning compounds such as disinfectants and insecticides that contain toxic or harmful substances should be stored separately.

**Space Requirements.** In walk-in refrigerators, shelf space having a depth of 1 to 2 feet should be allowed on either side of a 3- to 3½-foot aisle. Wider aisles are required if mobile equipment is to be moved in and out of the refrigerator.

Depending on the size of the operation, space may be provided in the day storeroom, in a separate room, or in the central stores for one person to assemble and bring needed ingredients to preparation centers (12). This area has been found to facilitate production and reduce labor time. If a separate area is designated for preparing ingredients, it should be equipped with a worktable, table scales, recipe file, portable table with demountable can opener attached, ingredient bins, and pallet for canned goods. The portable scale from the receiving entrance may be used as well as some equipment from preparation and bakery, such as measuring utensils and table scales.

When supplies and ingredients are weighed, measured, and issued from a central store, space for such activities and for storage of measuring utensils must be provided within the central store facility and storage facilities reduced accordingly within work areas.

The purpose of this area is to provide positive control of food supplies and to promote an efficient operation through better utilization of personnel time and use of standardized recipes. For example, one worker is trained and assigned to be responsible for handling supplies, adjusting recipes, and delivering weighed ingredients to preparation centers.

**Design Considerations.** For planning central and day storage areas, the following guidelines are offered:

1. Avoid uninsulated hot and cold water pipes, water heaters, refrigerator compressors or condensing units, and other uncontrolled heat-producing equipment.
2. Avoid storing equipment not in use or requiring care or maintenance in food storage areas.
3. Avoid excessive temperatures which are conducive to spoilage.
4. Provide well-ventilated, well-lighted, dry, and clean areas to inhibit the growth of molds and to prevent condensation on walls, ceilings, equipment, and foods.
5. Achieve proper and adequate lighting. Provide 15 to 20 foot-candles of light.
6. Maintain a 30-day supply of staples based on normal requirements. Storage space is reduced when suppliers can deliver frequently.
7. Equip storage areas with adjustable, demountable metal open shelving or portable stands to permit air circulation and facilitate cleaning.



**Shelving Arrangement.** Shelving should be arranged to accommodate a particular operation. Aisle space and space between shelving should allow easy access to commodities. Other recommendations follow:

1. Store and label bulk supplies; root vegetables should be placed in bins for proper rotation.
2. Place shelves a sufficient height above the floor to protect foods from splash and other contamination (13).
3. Follow local health department storage regulations.
4. Limit top shelf height to avoid use of a ladder.

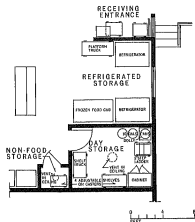


Figure 3. Dietary storage area for a 50- to 75-bed hospital.

5. Require aisles wider than 48 inches for maneuvering room if trucks, skids, or hydraulic jacks are used.

**Equipment List.** Total refrigeration requirements for term storage are estimated at 1.3 cubic feet per person to allow approximately 40 percent for frozen foods and 60 percent for chilled foods.

Additional refrigeration requirements for nonterm (daily) storage are listed under food production on page 26.

An equipment list for various areas of storage follows:

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
STORAGE			
Day.....	1	1	1
<i>Fixed Equipment</i>			
Cabinet.....	1	1	1
Ventilator at ceiling.....	1	1	1
<i>Movable—Major Equipment</i>			
Cas with cover, 10-gallon capacity.....	3	3	3
Dolly for can.....	1	1	1
Ladder, 2 steps with rails and step lock.....	1	1	1
Shelving, metal, adjustable, locking casters.....	1	2	1
Track, shelf type.....	1	1	1
Nonfood.....	1	1	3
<i>Fixed Equipment</i>			
Ventilator at ceiling.....	1	1	1
<i>Movable—Major Equipment</i>			
Shelving, metal, adjustable, locking casters.....	1	1	2
Refrigeration (frozen and chilled foods for 7-day term storage)			
Dairy, fruit and vegetable, and meat.....	—	—	—
<i>Fixed Equipment</i>			
<i>Movable—Major Equipment</i>			
Cabinet, frozen food storage, reach-in, 40-45 cubic feet, net capacity.....	1	2	4
Refrigerator:			
Reach-in, 40-45 cubic feet, net capacity.....	2	3	3
Shelving, metal, adjustable, locking casters.....	—	—	4
Walk-in, 150 cubic feet, net capacity.....	—	—	1

Note: A "blank" under the column, "suggested quantity," in the equipment lists, indicates that the item is required but the quantity is not determined. The quantity is determined upon correlation of schematic plans. The dash (—) indicates that the item is not applicable to the particular area.

## FOOD PRODUCTION

The food production area should be designed around work centers where foods are prepared, cooked, baked, and portioned in readiness for service. These centers are planned in relation to the functions to be performed and to other work centers.

In the small hospital, the food production area may be designed for one cook to perform all major functions, but in larger hospitals separate work centers should be provided as functions will increase and require more space for preparation, personnel, and equipment. For example, if 100 meals or less are served per meal period, one center can be used to prepare vegetables, salads, and nourishments, and in some instances, baked products. The cooking area should be designed to facilitate good flow of foods from preparation centers, and from dry and refrigerated storage, directly to serving areas.

Improved techniques in baking and trends toward purchasing ready or partially prepared proportioned bakery and dessert products have decreased the need for specialized baking equipment and extensive dry and refrigerated storage. This area may be entirely eliminated if all products are purchased. Simple desserts may be prepared in the cooking section.

### *Preparation, Cooking, and Baking*

In planning individual work centers for preparation, cooking, and baking, consideration should be given to the use of new food developments and techniques that have already influenced the design of equipment and facilities. Examples include oven-ready roasts and portion-control meats; prepared mixes, fillings, and toppings in baking; prepared soup,

and soup bases; frozen fruits and vegetables; prepared forms of potatoes and other vegetables; and new food packaging for cold storage. As a result, equipment and facilities may be reduced in size or entirely eliminated.

Food preparation centers are required for fruits and vegetables, meats, entrees, soups and sauces, salads, sandwiches, nourishments, and beverages.

A preliminary processing center may be eliminated if the hospital plans to purchase processed fruits and vegetables or those that have been trimmed, cut, and peeled. Evaluate carefully the need for peelers and sinks. A vegetable peeler should be placed on a mobile table so that it may be rolled into storage when not in use.

Disposal of bulky refuse, boxes, and crates will need to be considered.

If the hospital plans to prepare large quantities of root vegetables, provide storage bins in a well-ventilated storage area near vegetable preparation.

Allow sufficient work table space and storage for small equipment and utensils. Small tools should be stored in a rack in the table drawers or attached to the end of the table, and mobile vegetable bins should be stored underneath.

The vegetable preparation area should have sealed-vinyl or quarry-tile floors equipped with a grate covered trapped drain.

Meat preparation, prior to cooking, will be limited to boning, slicing, dicing, and grinding. In the smaller hospitals, meats may be prepared in the cooking area. In larger hospitals only minimal facilities, accessible to storage and cooking, are required when fabricated meat cuts, eviscerated poultry, precooked frozen entrees, and portion-ready frozen meat and fish items are purchased.

In the event that meat preparation is limited to portioning after cooking, the area could be shared for preparing nourishments and modified diets.

The design of the area for salads, sandwiches, and nourishments should be based on the number of workers to use it for the different tasks to be performed during the peak periods of service. If the salad preparation center is to be used for preparing sandwiches, fruits, juices, and nourishments, it may be desirable to subdivide the area and separate some functions to reduce crisscrossing and travel. For example, since sandwich preparation is frequently a major function in a hospital cafeteria this activity may require a separate work space. On the other hand, a separate work



center need not be provided for preparing nourishments unless the workload is especially heavy. Instead, the salad preparation or bake-dessert centers may be used.

**Function and Location.** The location of the various work centers for meats, vegetables, salads, and nourishments will be governed by individual functions, source of supplies, production flow, and operations within the food production area involving the preparation of foods in readiness for cooking and serving.

In larger hospitals, separate centers in place of an assembly line may be set up for handling special prescribed diets.

If salads, sandwiches, and nourishments are prepared in the same work center, its location should provide a functional flow for foods coming from central, dry, and refrigerated storage, direct delivery, and the fruit and vegetable preparation areas. Other foods such as meats may come from the cook's area. The work center should have access to the kitchen in the cooking area to prepare certain foods that may be used in salads.

All cooking functions are grouped according to methods of preparation. Dry-heat and steam-heat methods require broilers, fryers, ovens, ranges, and steam cookers and kettles. This area should be convenient to patient tray and cafeteria service areas. (See fig. 4, p. 27.)

Baking and cooking should be combined or adjacent so that ovens, mixers, and steam kettles may be shared. The separation of these sections by a wall limits the degree of supervision and sharing of equipment.

In hospitals with more than 200 beds, baking may be located apart from cooking. Mobile units should be available to transport products.

Supplies should be received and finished dessert products distributed to the tray service and cafeteria sections without creating traffic problems. Consider mobile and pass-through storage units between the baking and service sections and storage for some dry and refrigerated items. Unless the work centers for mixing, baking, and dish-up are located close to each other, additional storage and refrigerator space should be provided. Refrigerator needs may be combined for portion planning.

**Operational Aspects.** Purchasing practices vary in hospitals according to the kinds of fruits, vegetables, meats, and other items used. The extensive use of these items and frequency of deliveries affects storage and the kind of equipment required in the preparation area.

Many hospitals purchase more frozen and canned

fruits and vegetables than fresh products because of the time and labor involved in preparation. In some instances, fresh products are used only for salads and garnishes. Vegetable handling can be minimized if modular steam serving pans are used in preparation, cooking, and storage.

Nourishments may be prepared before breakfast or while the salad or dessert area is not in use. An additional refrigerator may be needed for storage depending on the number of special feedings and the method and schedule of distribution to the patient care units.

Nourishments refer to between-meal or frequent feeding prescribed by the physician, and may consist of gelatin, milk desserts, juices, low-sodium milk, and tea. Assuming that 30 percent of the total bed occupancy might require a modified diet and will be receiving a nourishment two or three times a day, the preparation would probably include a high-protein feeding or juice. Simple flavored desserts can be requisitioned from the baking and dessert sections. For example, if some form of liquid nourishment is served twice daily to patients on modified diets, the 50-bed hospital will prepare 2 gallons per day. Requests for simple snacks, when central dietary services are not available, will require storage of a limited supply of food items in the dietary facility on the patient care unit.

Hospitals should plan their cooking and baking sections according to the needs of the individual operation. The variety and volume of menu items to be prepared will influence equipment needs and planning of work centers. Before selecting equipment, therefore, it is important to determine the cooking load and placement of equipment so as to insure a smooth workflow.

The menu served during a normal 2- or 3-week cycle operation is used to estimate the maximum cooking load. Multiplying the number of persons to be fed by the number and portion size of each item determines the load. Preparation time is also an influencing factor.

If a separate section in the food production area is to be designed for baking, it should include sufficient space for mixing, baking, and finishing or dish-up of dessert products.

In planning this section, products will come from dry, refrigerated, and frozen food storage. Partially prepared products will be sent to the mixing center, whereas prepared products will be moved directly to finishing, dish-up, and/or service sections.

In the mixing center, the workflow is similar to that in cooking. Preparation is minimal if ready mixes are used.

Space should be included for combining such functions as mixing; preparing doughs for rolling, cutting, proofing, and panning; baking and removal to racks; and for placing items removed from baking pans.

Depending on the amount of items to be finished and dished up, it may be necessary to provide a separate work center for each function. In the dish-up center, a semicircle arrangement may be used to portion desserts.

In hospitals with more than 200 beds, the finishing center may be separated into several work centers for various functions, such as icing cakes and cookies. These functions will require a worktable, storage for small equipment, and a lavatory.

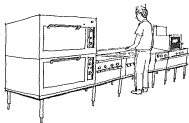
Consideration must also be given operational aspects, types, sizes, and capacities of major items of equipment such as broilers, fryers, ovens, ranges, steam cookers, and kettles. A discussion on each of these items follows:

**Broilers** with grids that are adjustable to permit flexible working heights and provided with safety stop locks are recommended. Broilers with cabinets which open below allow additional storage space. In larger hospitals, an infrared broiler unit may be considered if speed-cooking is a factor. Space requirements for these units are similar.



**Fryers**, high-recovery type and varying in fat capacities, may be considered for normal use. The 50-bed hospital may wish to install a counter-type model with a 15-pound fat capacity if limited frying needs are anticipated. Productive capacities of fryers are based on their heat recovery or inputs, and generally fry approximately  $1\frac{1}{2}$  to 2 times their weight of fat per hour.

Oven needs vary in each installation. If an operation requires only one oven, a "roast" oven offers more usable space than a "bake" oven to meet any



additional baking needs. "Roast" ovens are located in the cooking area rather than in baking. If a number of products are to be baked, a separate "bake" oven should be provided in the baking and dessert area.

"Bake" and "roast" ovens are available with mechanical or stationary decks. Mechanical deck ovens most often used are "rotol type," commonly referred to as revolving tray or rotary ovens. Mechanical ovens vary in capacity from 4 to 8 pans and are frequently used where many baked items are served. When 400 to 550 meals are served daily, the small mechanical tray-type 6-pan ovens can be used advantageously.

In hospitals with more than 200 beds or where demands warrant, two mechanical ovens of the proper size may be more economical than a number of smaller stationary deck ovens.

The stationary sectional oven allows different items to be baked and roasted simultaneously. Different temperatures can be selected for each section through the use of dual controls. They may be used to advantage by installations serving up to 400 meals daily.

The convection oven requires less floorspace than mechanical or stationary ovens and, in some instances, offers increased cooking capacity depending on the menu pattern.

Microwave or infrared ovens are desirable for defrosting foods and for heating foods for hold-trays. Infrared units require more time, but are proportionately less expensive to purchase than microwave ovens. Oven compartments vary in size.

Heavy-duty ranges controlled by burners or elements are available as solid hot-top, fry-top, and open-top sections, and may be used in combination.

Ranges without ovens underneath provide storage for mobile units, lessen traffic problems, and eliminate stooping and lifting for the worker.

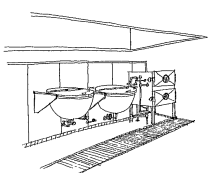
Spreader plates are available to provide additional working surface between and at the end of range sections.



Range cooking will vary. Space for the number of sections is determined by the type of cooking to be done. A careful check of range-top cooking is necessary. Foods cooked and served in the same pan decrease range needs.

*Steam cookers* are generally used to cook meats, vegetables, and other items in modular-size serving pans, perforated or solid, for quick and efficient service. The capacity of the steam cooker is determined by the steam pan capacity, designated in terms of pounds of food to hold 10 to 20 pounds of "as purchased," "ready to cook," or cooked weight.

Steam cooker compartments, 5-pound, low pressure types, are designed to cook a given number of meals per hour, based on modular-size pans, 12 by 20 by 2½ inches. Each pan has a capacity of 2½ servings. One compartment accommodates operations serving 100 to 150 meals per hour and is adequate for the 50-bed hospital. Two compartments, providing for from 200 to 500 meals per hour, are sufficient for 100-bed and 200-bed hospitals.



High-pressure steam cookers having a 15-pound capacity, are useful for fast, small, batch cooking of frozen, loosely packed vegetables. Each cooker will hold a 12- by 20- by 2½-inch pan having a capacity of from 30 to 35 pounds. It can be used in operations serving 50 to 100 meals per hour. Two compartments are sufficient for operations serving 50 to 300 meals per hour.

*Steam kettle* sizes are determined by specific food preparation methods, quantity, and amount of batch cooking. In hospitals having under 200 beds, kettle capacities from 5 to 20 gallons with hot and cold water connections and swivel faucets are sufficient for the rotation cooking of vegetables. Kettle capacities

range from 10 to 150 gallons for stationary-type models and from 1 quart to 80 gallons for the tilt-type models.

A 40-gallon kettle is the maximum capacity to be considered for any installation. The combination cabinet unit with steamer is available. Cantilever bracket installations aid in promoting better sanitation and maintenance of such equipment. Drainage for kettles is required regardless of the size of the operation. Floor drain facilities should be immediately available to the outlet of the kettle.

*Space Requirements.* The size of the operation and the type of menu served dictate the kind and capacity of equipment and layout needed. The floor-space required for the food production area can be estimated on the approximate overall dimensions of equipment. Aisle space and space for utility connections should be considered separately. The minimum space allowed for work aisles should be 3½ to 4 feet, and space for traffic aisles, 4½ to 6 feet. More space in both aisles may be required to accommodate a heavy workload and to maneuver mobile carts.

Meat preparation will require space for a cart, sink, table, food chopper, patty shaper, cuber, cutting board, and knives as well as mobile storage bins for scraps, bones, and waste.

Salad, sandwich, and nourishment preparation will require storage space for supplies, utensils, salad plates, trays, and glasses. An estimated 75 percent of the total number to be served may be used to determine these requirements. A refrigerator with ample storage space for salads and other items should be provided in this area.

In determining storage requirements for salads, an estimate can be made on the basis that a 14- by 18-inch tray holds 5 to 6 salads and an 18- by 26-inch pan holds 11 salads.

The salad preparation area also requires space for a table, two-compartment sink, waste disposer, slicer, chopper, mixer, utensils, measuring equipment, and storage. Some of this equipment may be shared with other sections. For example, a table model mixer is required for preparing salad dressing and whipped cream. Depending on the operation, the mixer in the baking and dessert or cooking area may be used.

If desserts are to be prepared in the baking and dessert area, but dished for service in the salad area, this flow should also be considered.

A reach-in refrigerator should accommodate shelves and tray and/or pan slides to permit storage of dishes and glasses. These storage units would be filled at the work preparation table.

In the larger hospital, additional mobile refriger-

ated storage units may be required. The height of the table should allow for placement of the units below the tabletop to facilitate use.

A mobile beverage cart with dual thermal control provides an efficient method for nourishment service from the food preparation area. A floor-level dumb-waiter or elevator is required for transporting the cart to the unit. Storage space should be provided for this in or near the salad-preparation work center.

Space is also needed for storing dessert dishes. This varies with the storage method. Additional floorspace is required if self-leveling, mobile dish dispensers are used, and if desserts are stored in refrigerator mobile shelf units. Dessert dishes may be stored on a table with shelves or in mobile bins or carts. The latter method of storage requires rehandling of dishes.

Storage for breads, rolls, ice cream, and other frozen desserts must be considered. The capacity of frozen-food cabinets will depend on the quantities of items used.

The requirements for frozen-food storage cabinets are estimated on  $\frac{1}{2}$  cubic foot of space per person served daily. The requirements for bake, cook, and salad refrigerators are estimated on  $\frac{1}{4}$  cubic foot of space per person served daily. Standard size tiered racks used for bread storage and baked products hold 18- by 26-inch bake pans.

Table 7 provides estimates of space requirements for various equipment items.

**Equipment Arrangement.** Equipment should be placed in relation to functions to be performed and for efficient supervision. Installation of fixed equipment should be carefully planned to facilitate thorough cleaning, and eliminate soil traps and vermin harborage. Mobile, portable, and cantilevered equipment allows for easy cleaning. The type of equipment and its arrangement varies according to the volume and variety of items to be produced.

Equipment should be placed for the convenience of the worker and away from traffic aisles. Work aisles should intersect at right angles with the traffic aisles.

Basic patterns used in planning work centers for new facilities are linear, parallel, square, L- or U-shaped arrangements. Linear placement works well in small facilities. Parallel, face-to-face placement allows supervision and discourages through traffic in the work aisle.

The arrangement of equipment for preparing meat may vary according to need and work habits. The layout of the meat preparation area should help facilitate the processing steps for typical meat products. One arrangement is to place a mobile table with a heavy

cutting board opposite the sink against the preparation table to allow clearance for working and for moving items within easy reach of the table. A magnetic rack for knives should be placed on the end of the table. This table should have shelves for holding supplies.

Workflow should move from cart to sink to table. The major use of the sink in this area may be for fish and poultry preparation. Select a plastic, rubber, or treated-wood cutting board that can be easily cleaned and sanitized for working on meat, poultry, and fish. It replaces the butcher's block.

After meat is shaped at the table, it is portioned, panned, and readied for final preparation. Another mobile utility table is needed in this area so that it can be moved to any desired location.

A utility table located in the cook's section may be used for the meat chopper and scales. A slicer can be mounted on a mobile utility table for use in other sections.

Broilers located adjacent to the ranges should match the range equipment. Broiler sections or docks may be stacked or placed side by side. Stacked deck installation will save floorspace.

"Free standing" broilers are preferred to the "back shelf" or salamander type for reasons of safety and sanitation. Moreover, the latter type, if mounted

Table 7. Equipment space requirements

Item	Overall dimensions (in inches)	
	Width	Depth
Broiler . . . . .	34-36	30-42
Fryer:		
Casser model, 15-pound fat capacity . . . . .	14-17	25-30
Floor model, standard 14- inches, 25- to 38-pound fat capacity . . . . .	15½-20	26-38
Lavatory . . . . .	20-24	18-20
Mixer:		
Bench-type . . . . .	15½	18½
Floor-type . . . . .	20½	35½
Oven, bake and roast . . . . .	55-60	36-42
Range, section . . . . .	34-36	38-42
Stand for bench-type mixer . . . . .	24	24
Steamer/cooker, standard com- partment . . . . .	32-39	32-33
Steam jacketed kettle:	<i>Diameter</i>	<i>Height</i>
20-gallon capacity . . . . .	20	36
20-quart capacity . . . . .	12	18

over the range, is difficult to use because of additional heat. It is used mostly for browning items or when only a limited amount of broiler food will be served. All areas of the broiler should be accessible for easy maintenance. Mobile units are also available.

Stationary deep fat fryers may be arranged at the end of a line to allow workspace around them. They should harmonize with the other equipment in appearance and be separated from the range by a spreader plate. Portable fryers are available with mobile table adjoining. Flexible utility hose is required. Range-matching installations vary in depth requirements from 26 to 42 inches.

Ovens used for cooking and baking should be arranged convenient to both work centers.

In hospitals with more than 200 beds, a bake oven, if needed, may be located in the baking section. Ovens and storage units should be located at the edge of the baking section to reduce traffic. A minimum of 4 feet in the work aisle should be allowed to remove items from the oven.

Oven manufacturers refer to section ovens as deck, cabinet, or stack ovens. Deck or section oven height is important. Two-deck, section roast, or combination ovens may be considered. Stacking of three or four sections will result in the overall height and depth being too high and too low, respectively, for the convenience of the workers.

Ranges should be grouped in an island arrangement provided with spreader plates in increments of approximately 6, 12, or 18 inches wide between and at the ends of cooking units. These spreaders, with front and rear enclosures, eliminate hard-to-clean areas and provide a surface for holding utensils. They may be used with any type of range, fryer, or broiler. A minimum of 12 inches is recommended.

Steam cookers and kettles generally are placed at the end of an equipment line to accommodate steam and plumbing connections and carts transporting items. Space for maneuvering the carts and for opening the steamer doors should be provided. Allow for space to be added to the overall width of the equipment for minimum clearance of steampipe connections.

Sinks and utensil storage should be provided for the convenience of the workers.

Tables for the cooks may be in an island parallel to the cooking equipment.

Refrigerators, scales, and mixers should be located conveniently in the cooking area.

Fixed or mobile pass-through storage units should

be provided for holding cold and hot foods between the periods of preparation and service.

Lavatories with mixing faucet, soap, single towel dispenser, and waste receptacle should be located for the convenience of those engaged in preparing, cooking, serving, and dishwashing.

The baker's table should be centrally located in the baking section and away from the wall to permit access from all sides.

Space should be provided near the baker's table for a mobile pan-storage unit and for a mobile tiered rack to hold food taken from the oven. This rack may be wheeled directly to the finishing or dishing-up centers. The space beneath the table accommodates mobile bins and other equipment.

Steam cooking equipment, ingredient scale, and mixer should be arranged to encourage good workflow. Locate the mixer conveniently between the baking and cooking sections, and within reach of a water supply. An accessory stand equipped with casters may be used to store attachments.

**Equipment List.** The various items of equipment suggested for use in the food production area are grouped below according to the preceding discussion. Some of these items may be used in other areas or may be omitted depending on the individual operation. The number of chill and freeze units needed for refrigerated term storage are included in the equipment list on page 19. The equipment items suggested for the food production area follow:

	<i>Suggested quantity</i>		
	<i>Number of beds</i>		
	<i>50-75</i>	<i>100-150</i>	<i>200-225</i>
<b>FOOD PRODUCTION</b>			
Vegetable and Salad Preparation . . .	<i>A</i>	<i>B</i>	<i>C</i>
<i>Fixed Equipment</i>			
Dispenser, waste, institutional size with preline spray . . . . .	1	1	1
Sink, two drainboards each, compartment 24 x 24 x 12 inches			
One compartment . . . . .	1		
Two compartments . . . . .	—	1	1
<i>Mobile—Major Equipment</i>			
Blender, electric . . . . .	1	1	1
Can, cover, 20-gallon capacity . . .	1	1	1
Cutter, food, bowl diameter 14 inches with stand . . . . .		1	1
Dolly for can with cover . . . . .	1	1	1
Extractor, juice, electric . . . . .	1	1	1
Opener, can, electric, heavy duty . . . . .	1	1	1
Peeler, 15-pound capacity per minute with stand . . . . .		1	1

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
<b>FOOD PRODUCTION—Con.</b>	A	B	C
<i>Mobile—Major Equipment—Con.</i>			
Rack, tool.....	1	2	2
Scale, portion.....	1	1	1
Stool, adjustable with back, 22-33 inches.....	1	1	1
Table, preparation, undershelf and locking casters 30 x 72 inches.....	1	2	2
Modified Diet and/or Neutrament Preparation.....	—	—	1
<i>Fixed Equipment</i>			
Sink, two drainboards, 2-compartment 24 x 24 x 14 inches..	—	—	1
<i>Mobile—Major Equipment</i>			
Bin on casters.....	—	—	1
Table, undershelf, locking casters:			
30 x 48 inches.....	—	—	1
30 x 60 inches.....	—	—	1
Cooking and Baking.....	1	1	1
<i>Fixed Equipment</i>			
Board, bulletin, 26 x 24 inches	1	1	1
Dispenser:			
Paper towel.....	2	2	2
Soap.....	2	2	2
Extinguisher system for grease fires in hoods and ducts.....	1	1	1
Fountain, drinking.....	2	2	2
Grease trap or interceptor.....	1	1	1
Hood and fan, ventilating, removable grease filters.....	1	1	1
Kettle, steam jacketed, tilt types, swinging water spout:			
Floor or cantilevered mounted, 20-gallon capacity..	—	1	2
Table or counter mounted, 20-quart capacity.....	2	1	1
Lavatory, spout outlet mounted 5 inches above flood rim, wrist control.....	2	2	2
Mixer, food, floor mounted, 30- to 60-quart capacity, 12-quart bowl, meat grinder, chopper and other attachments, interchangeable hubs..	—	1	1
Oven, capacity two 18 x 26-inch pans:			
Bake, single deck.....	2	2	1
Roast, double deck, one removable shelf.....	1	1	2
Range, fry, hot and open top, 1 section.....	1	1	2
Shelf above lavatory.....	2	2	2
Spreaders, plate.....	2	2	2
Steamer:			
1 compartment, 100-150 meals per hour.....	1	—	—

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
<b>FOOD PRODUCTION—Con.</b>	A	B	C
<i>Fixed Equipment—Continued</i>			
Steamer—Continued			
2 compartment, 200-500 meals per hour.....	—	1	1
Table, cooks, sink undershelf, 36 x 60 inches.....	—	1	1
36 x 90 inches.....	1	—	—
<i>Mobile—Major Equipment</i>			
Bin, roll under for bakers table.	3	3	3
Broiler:			
1 deck.....	1	—	—
2 decks.....	—	1	1
Cabinet, frozen food storage, reach-in:			
25-30 cubic feet, net capacity.....	1	2	1
70-75 cubic feet, net capacity.....	—	—	1
Crashin, can-bottle.....	1	1	1
Extinguisher, fire, CO <sub>2</sub> , portable.....	1	1	1
Fryer, deep fat:			
15-pound fat capacity.....	1	—	—
25- to 30-pound fat capacity..	—	1	2
Mixer, food, bench type, 20-quart capacity, 12-quart bowl on open shelf stand, locking casters, meat grinder, chopper and other attachments, interchangeable hubs.....	1	1	1
Rack:			
Bread storage.....	1	1	2
Cooling with casters, 24 x 18 x 72 inches.....	1	1	2
Utensil storage.....	—	—	1
Receptacle, waste, foot-operated closed top for lavatory.....	2	2	2
Refrigerators, reach-in, bake, cook and salad:			
20 cubic feet, net capacity..	2	—	—
40 cubic feet, net capacity..	—	2	4
Scale, bakers, tare beam, 16-pound capacity.....	1	1	1
Shelving, food file and roll out and gravity feed.....	1	1	1
Slicer, food, electric with stand.	1	1	1
Stand for broiler, open below.	1	1	1
Table:			
Baker, 2 drawers, 1 shelf above, open below for bins:			
30 x 72 inches.....	1	—	—
30 x 90 inches.....	—	1	1
Cook, under shelf, 36 x 60 inches.	—	1	1
Utility, 1 undershelf, locking casters, 30 x 24 inches.....	2	3	3
Track, shelf-type.....	1	1	2

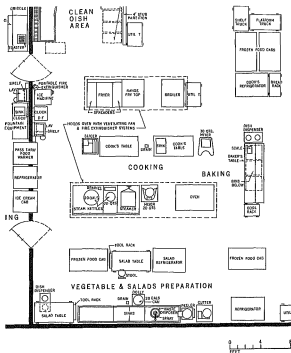


Figure 4. Food production area for a 100- to 150-bed hospital.

## PATIENT MEAL SERVICE



Every hospital dietary service, regardless of size, needs to focus special attention on protecting and holding prepared foods during the meal-serving periods. Thus, proper layout, equipment, and workflow should be planned to provide a safe, sanitary, and systematic method of handling and serving meals, protecting foods from contamination, conserving the nutritive value and flavor of these foods, and arranging and displaying foods for easy and rapid service.

### Tray Service

The building design and the method of tray distribution will influence the selection of the tray-serving system. The two basic systems are centralized and decentralized. Many modifications of both systems exist because of physical layout. The centralized-bulk system combines these two systems. In a decentralized system, some activities are performed in a central area with serving and dishwashing activities performed on patient care floors.

**Function and Location.** The tray-serving area should be convenient to the cooking, baking, dessert, and salad sections to permit these items to be easily wheeled to the area.

The tray setup section should be located at one end of the assembly table so that setup items may be easily reached by a worker. A mobile combination tray and flatware dispenser and a mobile shelf-type table arranged on either side of the worker lessens fatigue and saves time. The table should accommodate at least two 14- by 18-inch serving trays for holding such items

as menus and diet cards. Shelves above the table may be used for trays of breads, dry cereals, and other items. Bread dispensers may also be needed.

The serving line should feed into the vertical tray carrier shaft or the mobile tray conveyors. Mobile food-holding units and dual temperature control tray conveyors will require electrical outlets at the point of use.

**Operational Aspects.** Centralized tray service is being used in many hospitals because it makes for greater efficiency and economy, provides for better supervision and utilization of personnel time, and adds flexibility to the operation.

When trays are centrally prepared and checked under supervision, service is direct to patients, and the need for tray-serving facilities on patient care floors is eliminated. Various methods of tray distribution are easily adapted to the central tray system.

The general hospital with a pediatric unit may require a more individualized service. Mobile serving carts could be used to serve trays directly in the unit.

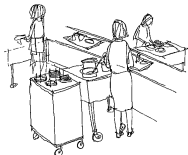
Mobile or stationary serving tables are designed to handle trays automatically by a moving belt, or manually by skew-wired or shelf-type arrangements. The latter are generally used for 50-bed hospitals, but may be used for a 100-bed hospital. (See figure 5 page 31.)

**Space Requirements.** The space required for the tray-serving area depends on the system and equipment used for assembling the trays. Equipment is required for tray setup; serving hot foods, soup, and cereals; serving cold foods and beverages; and checking. Additional floorspace may be required for a dish oven and dispenser.

The length of the tray setup table varies with the number of menu items to be served, and with the size, kind, and number of mobile serving units.

A minimum of 4 feet should be provided as clearance space between equipment in the tray assembly line setup and equipment which may be located across the aisle from it. Allow 5 linear feet per worker for straight-line arrangements.

Space is required for mobile serving units holding hot and cold foods and for glass racks. The cold line usually requires more space than the hot line because of the number of items to be served. Its length may be shortened by placing some cold items on the hot side, and by proper use of tiered space.



Space should be provided for preparing hot beverages near the tray-serving line. In the areas of the country having a high sodium water supply, provision should be made for separate salt-free beverage service. If the beverage-preparation unit is fixed, a mobile table is required for holding insulated beverage containers on the line.

Space should be provided at the end of the serving table for checking trays. A shelf above the table or a mobile table adjacent to it should be provided to hold reject trays and to maintain the work tempo.

Most mobile tray conveyors occupy between 15 and 18 square feet of floor space and require storage space as near as possible to the end of the tray line.

Sufficient aisle and workspace should be allowed for the worker to load the mobile tray conveyor from either side of the serving line and to wheel the conveyor to its destination.

At least four workers will be needed to handle a minimum serving line. Preset trays will require fewer personnel, but tray handling is increased. A mobile table unit rather than a stationary table or counter for assembling trays is recommended for the 50-bed hospital. This arrangement allows greater flexibility. Additional mobile serving and dish dispensing units can be added as bed capacities increase.

**Equipment Arrangement.** Mobile equipment should be grouped so as to minimize the length of the tray serving line and provide greater convenience for the worker. If a straight-line arrangement is to be used, 8 to 24 linear feet may be required to accommodate the units needed on the line. These dimensions vary with the width of the serving units.

A minimum number of auxiliary serving units, dish-dispensing units, and other equipment needed for tray setup should be provided.

An L- or U-shaped arrangement of the equipment should be considered to bring it within easy reach of the workers. Mobile units holding foods may be arranged on the serving line to permit cold and unheated foods to be placed on the tray before hot foods or on either side for simultaneous serving.

Mobile serving units should be arranged to suit the needs of the meal and, when not in use, moved to another serving unit or stored. Equipment required for serving breakfast differs from that needed for serving noon and evening meals.

Where the serving table divides the hot- and cold-food services, the serving units holding hot foods should be located on the same side as the cooking area, and refrigerators should be accessible to cold-food service.

Stationary tray setup line arrangements should allow mobile serving units to be placed within easy reach of the workers.

Space is required for mobile serving units holding hot and cold foods and for dish-storage units adjacent to the assembly table. Most mobile serving units have countertops which accommodate interchangeable modular sized serving pans.

The unit for serving cereal/soup may be placed near the end of the line and, preferably, opposite the beverage section. In small installations, it is advisable to combine the serving of soup or cereal with other hot foods. If a separate section is desired, a dispenser for heated bowls should be placed adjacent to the mobile cereal or soup serving unit.

If mobile dish-dispensing units are not used, a portable table should be placed adjacent to the server for holding trays of insulated bowls and stacks of heated plates. Space will be needed for heating and storing plate covers.

In some instances heated lead discs may be needed to maintain serving temperatures of the entree. Individual insulated beverage and bowl containers prevent transference of hot or cold temperatures to other foods. Heated discs are generally used in conjunction with a dumbwaiter, vertical-belt tray-carrier system and, when enclosed, unheated mobile tray conveyors transport trays to distant points.

## Tray Distribution

Methods effectively used in hospitals for tray distribution to patient floors are vertical-tray carrier systems, high-speed dumbwaiters, and service elevators. Two separate vertical tray carriers should be used, one for patient trays and the other for returning soiled trays to the dishwashing room. Separated shafts are

more costly, but they do allow greater planning flexibility. The two-shaft system is important in preventing the transfer of infections. In emergencies such as mechanical failure of the vertical tray carrier system, traditional carting methods may be required.

The horizontal tray assembly belt system equipped with a variable speed mechanism is used to transport trays to the vertical shaft and/or to mobile tray conveyors. Belt systems may be used in installations that serve more than 100 trays and have at least 5 workers to assemble the trays. When a vertical tray carrier system is used, a shelf-type dumbwaiter should be provided in addition, so that any special requests may be facilitated without interruption to the serving line. The use of the automatic ejection system mechanically loads and unloads trays from elevators and dumbwaiters.



Floor-level dumbwaiters usually require two shafts to provide speedy service for installations planning to use enclosed, 5- to 8-tray capacity, unheated carts.

Shelf dumbwaiters require at least two or three shafts. Most shelf-type dumbwaiters can carry only six trays which must be unloaded and the dumbwaiter returned for additional trays. One shaft slows down the operation.

Hospitals planning to use elevator service for their food distribution system should make an elevator available exclusively to tray distribution during the meal-serving periods. In hospitals with more than 100 beds, a dumbwaiter should also be provided to handle immediate requests. If elevators are used, open or semienlosed, unheated carts should be avoided. When mobile hot, cold, or unheated tray conveyors are used, service elevators are usually required because of the

weight and size of the equipment and the space needed to accommodate the food service worker assigned to handle the conveyor.

There are many types of mobile tray conveyors. Some are designed with separate compartments for hot and cold food trays. These trays must be combined on the patient floors. Other conveyors have been designed to physically separate the hot and cold foods on the tray without interfering with the arrangement of foods on the tray. Such mobile units require storage space on the patient floors during the serving period in a separate area or alcove. Dual-temperature tray conveyors require electric outlets.

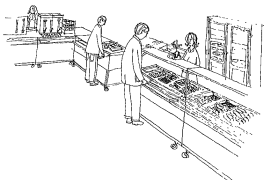
**Equipment List.** The various equipment items suggested for use in the tray setup, serving, and distribution area are listed below. Some of these items may be used in other areas or may be omitted depending on the individual operation.

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
	A	B	C
<b>TRAY SETUP, SERVING, AND DISTRIBUTION</b> .....	1	1	1
<i>Fixed Equipment</i>			
Clock outlet and electric clock	1	1	1
Coffeemaker, stand:			
Twin urn, 3-gallon capacity each, water chamber, 6-gallon capacity	1	1	—
Twin urn, 8-gallon capacity each, water chamber, 12-gallon capacity	—	—	1
<i>Conveyor, tray:</i>			
Horizontal assembly, open type	—	1	1
Vertical, ascending-descending type	—	—	2
Dumbwaiter	—	1	1
Intercommunication system to patient floors	1	1	1
Machine, leemaking and dispensing	1	1	1
<i>Mobile—Major Equipment</i>			
Cabinet, ice cream, uplight:			
10-gallon capacity	1	—	—
20-gallon capacity	—	1	1
Conveyor, tray, mobile, unheated, enclosed, 20-24 tray capacity	2	4	
Dispenser:			
Flatware, 4 compartments	1	2	4
Self-leveling with locking casters			





## CAFETERIA SERVICE



Many hospitals provide cafeteria facilities for personnel, visitors, and ambulatory patients. Such facilities generally include an area for serving and dining. In addition, lounge facilities may be indicated if many visitors are served. Depending on size and location of the dining area and speed of service, a coat-checking area may be needed.

Toilet and handwashing facilities should be located near the dining area, especially where patients and visitors are accommodated. These facilities are in addition to those required for food service personnel in the food production and serving areas.

Separate dining facilities are rarely indicated when patients, personnel, and visitors use the same serving line. However, if separation is warranted, devices such as folding doors and planter screens may be used to divide the area without limiting its use for other purposes.

### *Serving*

Hospitals usually provide separate serving facilities for patients and personnel. However, some hospitals with fewer than 50 beds may use the same serving units if the layout permits and meal hours do not conflict. Mobile serving units are recommended to facilitate their dual use.

In planning the cafeteria, speed of service and adequate seating are important. Usually the serving counter is parallel to the length of the room so that workers travel less distance and diners move more

quickly. The counter length is determined by the quantity of food to be prepared and displayed.

When the service area has been designed as a hollow square, the minimum dimensions of the serving counters should be 18 to 20 feet by 14 feet. (14)

### *Dining*

In planning the dining area the following factors should be considered:

1. Incoming and outgoing traffic should be permitted from various areas of the room.
2. Aisles should be wide enough for persons to pass each other and for movement of mobile equipment.
3. The number of entrances and exits to dining and serving areas should comply with local fire ordinances.
4. The cafeteria exit should be contiguous to the dishwashing area to facilitate return of trays to the dishwashing room.
5. Self bussing of trays requires mobile dish and tray storage racks near the exit and convenient to the dishwashing room.
6. A horizontal belt used for removing dishes from the dining area will speed service, lessen noise, and reduce labor. A pass-through window may be used.
7. The gravity or open-belt trough-type conveyor should be suitably screened from the dining area. This depends on location and layout of cafeteria.
8. If the cafeteria is not located on the same floor with food production and dishwashing, transportation of food and tableware to the serving areas must be provided.

**Space Requirements.** Serving line requirements depend on menu, number of persons served per peak period, and the time period allowed for serving. Most of the traffic in the serving line will be eliminated if the "pass-through" type of refrigerated and heated food storage cabinet units are used to divide the food preparation and cafeteria areas. Units should be thermostatically controlled.

In estimating space requirements, accommodations for serving patients modified diets, for preparing and grilling sandwiches, and for checking meals should be considered.

Special provision may be necessary if patients on modified diets are served in the cafeteria. Where counter space is limited, a bulk food cart may be used. A part of the tiered "cold" counter display should be used to arrange special salads, desserts, breads, and spreads.

Additional space is needed on the serving line for preparing sandwiches and cold plates and for displaying a variety of desserts. Display cases on cafeteria lines will vary in width from 9 to 18 inches. Where sandwiches and grill items are in demand, a separate serving line should be considered to help prevent interruptions to the main serving line. The griddle may be flush with the countertop or mobile units may be preferred.

Since most cafeterias operate as a pay service, space should be required for a cashier. Mobile checkers and cashier stands permit flexibility within the area. If the cashier section is part of the serving line, a space should be provided on the counterline for equipment. An electric outlet is needed for the cash register. The cashier should be located several feet away from the serving line so that space for observing and checking is assured.

Cash registers with an automatic change release are recommended for hospitals with more than 200 beds.

Dining area requirements depend on seating arrangement, table width, and aisle space, and may be estimated on the basis of 25 square feet per person. This includes space for major work and service aisles, for 48-inch-square tables, and for accommodating wheelchair patients.

The total square footage of dining space may be calculated by multiplying the number of persons to be seated at one time by the space requirement for each. For example, in the 200-bed hospital which serves approximately 200 meals in the dining room, two serving periods would be planned with 100 persons served during each operation. Therefore, approxi-

mately 2,500 square feet would be needed for the dining area plus 640 square feet for the serving area.

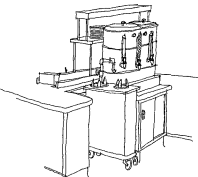
Drinking fountains and the rack for glasses should be placed so as not to interfere with the serving line. If extensive food and beverage vending is contemplated, additional space may be required.

Coat racks should be provided, convenient to the cafeteria entrance. Tray stands are required for holding trays.

**Equipment Arrangement.** Serving areas should be equipped with mobile serving counters designed with openings which can accommodate various types of mobile serving units, provide a base for other pieces of equipment, and save floor space in the serving area.

Hot food serving units should be arranged as part of the counter and be designed with interchangeable top panels to accommodate standard serving pans.

Cold food serving units should precede the hot-food units in the serving line. Units as cold pans may be cooled mechanically, or filled with ice. The cold pans should be 6 to 8 inches deep and 24 inches wide. Drains are required.

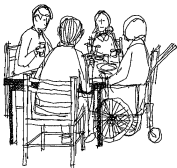


Coffee urns or brewers should be placed on or near the serving line. Urns may be used to provide boiling water for preparing soluble beverages and are usually preferred for self-service. Self-service beverage dispensers may be set up away from the serving line. Cups, saucers, and beverage supplies should be provided at the preparation area where cream and milk dispensers also may be located. Mobile dish-dispensing units or shelves in the urn stand may be used for storage. Combination tray and silverware dispensers are recommended.

Electric or gas conveyor or slot-type toasters will

be required for toasting bread and buns. Where requirements are heavy, conveyor models are recommended. A four-basket conveyor, 24 inches wide, 17 inches deep, and 30 inches high toasts about 700 slices per hour. Electric, slot-type toasters mounted on counters or stands with casters are versatile and may be wheeled to the serving line. This type will toast about 250 slices per hour.

In the dining area, square tables arranged diagonally rather than in straight lines allow better use of space. Aisles should be wide enough to permit persons to pass each other and at the same time allow diners enough room to sit or leave the table. Tables with adjustable heights should be provided for wheelchair patients.



If persons dine from their trays, the table must accommodate the number and size of trays to be used. A 48-inch square table is more suitable for four standard 14- by 18-inch trays than a 36- or 42-inch square table. A 36-inch square table is suitable if persons do not dine from their trays. This size table will not accommodate four rectangular trays larger than 10 by 16 inches. Trapezoid-shaped trays, 14 by 22 inches and 14 by 18 inches, can also be accommodated.

Aisles between tables should also provide space for seated persons. A minimum of 18 inches should be allowed between chairs for passage. Racks should be provided to hold diners' trays. Aisle space requirements vary with the size of mobile units. (See fig. 6, p. 36.)

**Equipment List.** The equipment items needed for the cafeteria and dining areas are listed. Mobile equipment should be substituted for fixed equipment wherever possible for flexibility.

	<i>Suggested quantity</i>		
	<i>Number of beds</i>		
	50-75	100-150	200-225
	A	B	C

#### CAFETERIA—DINING AREAS

##### *Fixed Equipment*

Back bar, shelves, open below....	1	1	2
Board, menu.....	1	1	1
Clock outlet and electric clock....	1	1	1
Cold pan unit.....		1	2
Conveyor to dishwashing room, gravity type with trough....	1	1	1
Counter, serving, table-type, with open base below.....	1	1	1
Dispenser:			
Paper towel.....	1	1	1
Soap.....	1	1	1
Fountain, drinking, electric, cafeteria-type.....	1	1	1
Griddle, flush with counter top, with exhaust fan.....		1	1
Lavatory, spout outlet mounted 5 inches above flood rim, wrist control.....	1	1	1
Panel, glass.....	1	2	2
Partition, folding.....			2
Railing.....		1	1
Shelf, serving, panel and glass protector.....	1	1	2
Shelves, glass, display....	3	3	3
Sink in counter, open shelves below.....	1	1	2
Slide, tray.....	1	1	1
Table, hot, food, waterless, inter- changeable inserts 24 x 48 x 30 inches.....		1	2
Warmer, food, pass-through to cooking area.....		1	1

##### *Mobile—Major Equipment*

Cabinet, ice cream, upright:			
10-gallon capacity.....	—	1	—
20-gallon capacity.....	—	—	1
Cas, pastry, stand.....	—	—	1
Cash register.....		1	1
Chair, dining.....	24	48	96
Coffeemaker, vacuum type, 5 elements.....	1	1	2
Dispenser:			
Cream, 2-quart capacity.....	—	1	2
Flatware, 4-compartment....	1	1	2
Mobile, self-leveling			
Heated:			
Bowl, 2-compartment, 6- dozen capacity.....	—	1	2
Dish, vegetable or dessert: 1-compartment, 6-dozen capacity.....	—	1	—
2-compartment, 12-dozen capacity.....	—	—	1

	<i>Suggested quantity</i>		
	<i>Number of beds</i>		
	<i>50-75</i>	<i>100-150</i>	<i>200-225</i>
	<i>A</i>	<i>B</i>	<i>C</i>
<b>CAFETERIA—DINING AREAS—Con.</b>			
<i>Movable—Major Equipment—Con.</i>			
Plate:			
1-compartment, 6-dozen capacity . . . . .	1	1	—
2-compartment, 12-dozen capacity . . . . .	—	—	1
Unheated:			
Dish, vegetable or dessert:			
1-compartment, 6-dozen capacity . . . . .	1	1	—
2-compartment, 12-dozen capacity . . . . .	—	—	1
Plate, bread/salad, 2-compartment, 12-dozen capacity . . . . .	—	1	2

	<i>Suggested quantity</i>		
	<i>Number of beds</i>		
	<i>50-75</i>	<i>100-150</i>	<i>200-225</i>
	<i>A</i>	<i>B</i>	<i>C</i>
<i>Movable—Major Equipment—Con.</i>			
Dolly:			
Cup . . . . .	1	1	1
Glass . . . . .	1	1	1
Tray racks . . . . .	1	1	2
Rack, coat, shelf above . . . . .	1	1	2
Refrigerator, reach-in:			
20 cubic feet, net capacity . . . . .	—	1	1
40 cubic feet, net capacity . . . . .	—	—	1
Serving unit, mobile, food, hot-cold . . . . .			
Stand, folding, tray . . . . .	1	2	3
Table, dining, 48 x 48 inches . . . . .	6	12	24
Toaster, electric, heavy duty, 4-slice . . . . .			
	1	1	2

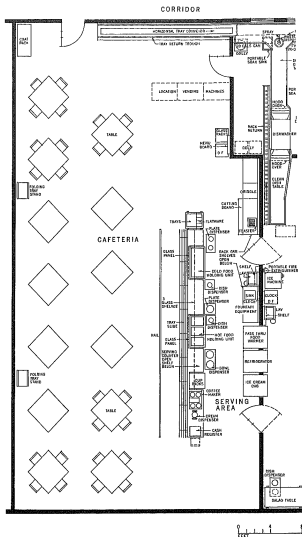


Figure 6. Cafeteria and dining room for a 100- to 150-bed hospital.

## Sanitation

Physical considerations for sanitation begun during the planning phase will help assure satisfactory maintenance of dietary facilities. Built-in problems in environmental control are decreased when the necessary equipment items are housed in structures designed for easy maintenance.

Failure of planners to check the need for floor drains, hose bibs, exhaust ducts, and other mechanical or engineering requirements prior to construction results in additional sanitation and maintenance problems, needless inconveniences to the entire operation, and increased installation costs.

A quality dietary service in relation to sanitation will be possible only if the hospital's procedures provide for

the following:

1. That the hospital laboratory or local public health sanitarian routinely evaluate the food production environment through sampling for micro-organisms;

2. That responsible dietary personnel check daily to verify proper temperatures of:

- (a) food in food-storage facilities and food-holding units;
- (b) wash and rinse water for the dishwashing and potwashing operations.

The materials, design, construction, and installation of equipment should comply with the Public Health Service standards as contained in the "Food Service Sanitation Manual" (13) and those of the local State health departments.

### DISHWASHING

Each hospital dietary operation must provide a separate room for handling and washing its tableware under sanitary conditions in an efficient, economical manner. Before this goal can be accomplished, the many activities connected with the overall functions of dishwashing must be considered. These activities include receiving, washing, and sanitizing all soiled tableware; returning clean ware to patient and cafeteria tray-serving sections; sanitizing patients' water glasses and carafes; cleaning mobile tray conveyors and/or carts; storing and handling of dishracks and dish dispensers.

Some advise separating the clean and soiled areas of the dishwashing room by a wall so that activities connected with handling clean and soiled ware may be completely separated. Others believe that more emphasis should be placed on proper training, improved supervision, and better techniques rather than on separate physical layouts. Both groups stress the

need for improved ventilation and lighting to promote better sanitation and physical comfort in the dishwashing facilities.

The dishwashing room should be physically separated by partitions from the food production and serving activities, and from the cafeteria serving line and dining area. This separation is recommended for reasons of sanitation as well as to eliminate noise, steam, and other distracting elements associated with dishwashing activities.

If complete separation is not feasible, the room's layout should discourage the same worker from handling clean dishes after handling soiled dishes. Facilities for proper handwashing should be provided between the clean and soiled areas.

**Function and Location.** In selecting a location for the dishwashing room, consideration must be given to the method of patients and personnel food service dis-

tribution, type and size of the operation, and the use of dietary facilities on patient care floors.

In planning new installations, it may be feasible to design the tray setup section and dishwashing room around or near the location of the vertical tray carrier type of transportation. In such a case, the descending shaft should connect with a horizontal takeoff belt ending at the soiled dish table.

The area for handling soiled ware should be located conveniently for receiving tableware being transported horizontally and/or vertically from patients and personnel meal service.

When the cafeteria is near and on the same floor as the dishwashing room, a straight-line arrangement of a mechanical belt conveyor should be considered for removal of soiled dishes from the dining area to the dishwashing room. Carts with tray slides may also be used.

The soiled and clean dish tables should be adequately separated, preferably by a wall, to minimize splash and aerosol from scrapping and prerinse operations.

**Operational Aspects.** A central dishwashing system should be employed when patients' trays are assembled in the serving section of the food production area, when the cafeteria is located close to and on the same floor as food production, and when horizontal and vertical transportation is convenient to the dishwashing area from these points.

A decentralized dishwashing system should be considered only when physical layout or a separate building makes the use of a central tray system impractical.

In planning for a central dishwashing system, the workflow involved in handling and washing tableware from patients and personnel must be considered. The flow should be planned according to the method of transporting trays from the patient care units and cafeteria to the dishwashing room. The rate at which dishes appear on the soiled and clean dish tables, and their return to the tray and cafeteria serving lines must be considered. Assembly line methods work well in this unit.

The method of dishflow from the cafeteria should be selected on the basis of minimizing noise, confusion, and unsightliness. Various installations have found that a skate wheel or a mechanical-belt arrangement removes dishes quietly and efficiently. If the skate

or belt is located near the cafeteria  
placed on the moving belt by  
to area. The belt may be ar-  
or, in larger rooms, placed in  
the convenience of the diners. A

mobile cart located near the cafeteria exit may be used in place of mechanical arrangements. Carrying dishes for long distances should be avoided. An efficient method of bussing must be employed to assist the dishwashing operation.

Chemical and mechanical developments designed to economically and automatically wash dishes, glasses, and flatware through the same machine must be considered in planning the area. The use of improved detergent products and well-designed dishwashing equipment improves sanitation, eliminates some equipment, saves labor time, and decreases dish inventory as well as dish storage space.

Consideration should be given to the proper detergent based on water hardness and suitable for the particular type of warewashing.

Perforated cylindrical containers holding flatware are placed in carrier baskets and used for both washing and dipping. These baskets may be removed, placed on mobile units, and wheeled directly to tray setup sections. If flatware must be washed in open baskets, it should be placed only one layer deep and mixed in kind to insure adequate exposure to wash and rinse spray. Space should be provided for a sorting table. A presoak sink for flatware is placed to the right of the scrapping operation on the soiled dish table, and should be deep enough to submerge a dinner knife standing in a cylinder in the rack. Portable or plastic soak sinks are available. In some instances, where the dishwashing machine is not equipped with a rinse injector, it is necessary to provide dip sinks for the clean flatware. This final rinse sanitizes as well as eliminates spotting.

**Space Requirements.** Soiled dish table requirements are readily determined when prerinsing and refuse disposal methods have been resolved. The dish table should have sufficient space to accommodate the stacking of service trays and the maximum expected flow of soiled dishes which must be unloaded, scrapped, sorted, stacked, racked, and prerinsed. Space for two 20- by 20-inch racks should be allowed between prerinse and the dishwasher for a continuous prewashing and racking process. Less space is required when the prerinsing function is part of an automatic dishwashing operation. A soak sink is needed for some items such as egg dishes.

Space should be allowed on the soiled dish table for a prerinse and food waste disposer system to help keep the wash tank free from refuse. A manual prerinse on the cold water line is recommended. Space beneath the table may be used for waste receptacles for



paper foil and food not readily disposed by mechanical means.

When mobile tray conveyors are used to unload soiled dishes directly into the area, more floor space may be needed in the soiled dish area than when a belt conveyor is used to unload trays directly onto the soiled dish table. (See fig. 7, p. 42.)

Space should be provided, preferably near instead of within the area, to sanitize the mobile tray conveyors and dish carts before returning them to the serving section. A mobile self-contained jet-stream or detergent spray type of cleaner unit may be used.

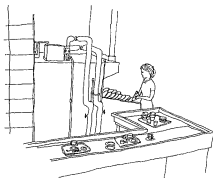
Clean dish area requirements vary according to the serving method and type of equipment used. Additional space may be required for air-drying dishes before they are stacked and loaded into mobile dish carts or stored in dish dispensers.

A rack-type machine should have a minimum clean landing space to accommodate four or five 20- by 20-inch dish racks and two stacks of 14- by 18-inch and/or 15- by 20-inch serving trays.

The length of clean dish tables can be greatly reduced when an automatic rinse injector technique is used with new rinsing agents. Such agents permit quick-drying and immediate stacking of dishes in mobile storage-dispensing units.

Where mobile units are used for storing dishes, more space is needed in the clean section than would be the case if dishes were repeatedly loaded and transported by a single unit for storage in serving sections. This transportation and storage is made easier and quicker through the use of self-leveling dish-dispensing units or fully enclosed portable dish carts of stainless steel, fiberglass, or aluminum.

Work areas should be planned in terms of the aver-



age worker's reach, two-handed motions of workers, and minimum lifting of loaded dish racks by the workers. A minimum of  $2\frac{1}{4}$  to 3 feet of linear working space at the table should be allowed for each worker. Vertical shelving space is recommended to provide additional linear space.

Floor space requirements for dishwashers vary depending on the type and capacity of machine selected.

Dishwashing equipment should be chosen with a view toward promoting sanitation (16). Table 8 shows examples of machines suited to 50-, 100-, and 200-bed hospitals. Column 2 refers to the peak meal period. The capacity of machines should be based on 70 percent efficiency. The rackless conveyor-type dishwashing machine may be considered if labor and space needs are at a premium.

Table 8. Dishwashing machine space requirements.

Hospital size (No. of beds)	Persons served (per meal)	Type of machine	Dimensions (inches)		
			Length	Width	Height
50-75	75-200	Door type, timed cycle, single tank, capacity 35 racks per hour, 675 dishes per hour.....	26	29	67
100-150	150-400	Rack conveyor type, single tank, capacity 150 racks per hour, 3,150 dishes per hour.....			
200-225	300-900	Rack conveyor type, double tank, capacity 200 racks per hour, 3,000 dishes per hour.....	42-55	29	66
		or	64-80	29	66
		Rackless conveyor type.....	138	33	75

A lavatory with a foot, knee, or elbow control should be located so that workers may wash their hands, preferably in clear sight of supervisory personnel who are responsible for seeing that clean dishes are handled with clean hands.

**Equipment Arrangement.** The soiled dish table may be arranged to permit workspace for two persons, one to scrape and sort, and the other to stack, rack, and pre-rinse.

If a mechanical belt is used for unloading soiled dishes into the dishwashing room, facilities should be provided near the beginning of the workline for handling and racking cups and glasses and for soaking flatware.

Slanted rack shelves at a 30-degree angle may be arranged about 15 inches above the soiled dish table for holding cup and glass racks. The new half-size, light-weight, or full-size plastic racks should be considered for ease in handling.

Shelves should be accessible to workers from either side of an island table. Racks can be used for washing cups and glasses, as well as for storage, to eliminate contamination by rehandling and to lessen dish breakage. Shelving should be provided for storing detergents and other supplies.

In areas where separate glasswashers are required by law, ample soiled table space and required attachments should be provided. Locate so as not to conflict with flow of tableware.

The area for handling clean ware should be arranged conveniently for the exit of "clean" dish mobile units and carts directly to the patient tray and cafeteria service areas.

**Facilities for Sanitizing Tray Conveyors.** Facilities will be needed for cleaning mobile food-serving units and tray conveyors before they are returned to the tray serving section. A spray-type germicidal detergent should be considered. Most tray conveyors are designed so that racks may be removed for easy cleaning.

**Food Waste Disposers.** Commercial food waste disposers are necessary to maintain better sanitation in food service installations, especially where tableware is washed. Many hospitals find it economical to provide disposer units at the origin of waste; for example, the preparation, potwashing, and dishwashing areas. The unit is installed in a drainboard or drain-table rather than in the sink. Removable tops are available for additional work surface. The size of disposer selected should be based on the number of meals as well as the type of feeding installation (17).

Disposer requirements should have sufficient horsepower capacity to handle the estimated pounds of waste. Capacity of the unit increases to accommodate additional load when only one unit is to serve the entire operation. The 50-bed hospital will require 1 horsepower.

Disposer systems that take paper are now on the market, thereby eliminating handling of paper waste.

Table 9 shows the various sizes of disposers suggested for the different areas.

Table 9. Waste disposers in food production

Hospital size (No. of beds)	Total meals served daily	Persons served (peak period)	Soiled dish table (h.p. size)	Veg-table and salad preparation areas (h.p. size)	Potwashing (h.p. size)
50-75	192-250	80-125	1	$\frac{1}{2}$	$\frac{1}{2}$
100-150	435-653	180-280	2	1	$\frac{1}{2}$
200-225	896-1005	380-430	3	$1\frac{1}{2}$	$\frac{1}{2}$

Minimal requirements for disposers in various size hospitals and suggested areas of use are given in table 10.

Table 10. Minimal requirements of food disposers

Hospital size (No. of beds)	Meals served	Disposers	Dishwashing	Area of use	
				Preparation	Potwashing
50	250	1	1		
100	450	2	1	1	
200	1,050	3	1	1	1

In the larger hospitals the horsepower capacities may also be estimated on pounds of waste to be disposed per hour; e.g.,  $\frac{1}{2}$  h.p. for 100 pounds. Paper and plastic disposable items need special consideration. Appropriate types and sizes should be selected.

**Equipment List.** An equipment list for the dishwashing room follows:

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
	A	B	C
DISHWASHING .....	1	1	1
<i>Fixed Equipment</i>			
Conveyor, tray:			
Horizontal, tray-dish rack handling from soiled dish table .....	1	1	1
Vertical, descending type .....	—	—	1
Dishwashing machine, automatic flow model, 20- x 20-inch racks with booster heater, detergent dispenser, rack return conveyor, rinse injector and splash guard, wash and rinse thermometers:			
Conveyor type, single tank, 150 to 216 racks per hour capacity .....	—	1	—
Door type, automatic, single tank, 35 to 50 racks per hour capacity .....	1	—	—
Rackless type .....	—	—	1
Dispenser:			
Paper towel .....	1	1	2
Soap .....	1	1	2
Dispenser, waste, removable, adjustable, flatware guards, preflush assembly, institutional size in soiled dish table .....	1	1	1
Hood and fan, ventilating .....	1	1	1
Lavatory, spout outlet mounted 5 inches above flood rim, foot, knee, or elbow control ..	1	1	2

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
	A	B	C
<i>Fixed Equipment—Continued</i>			
Partition, glass above waistcoat	2	2	5
Shelf above lavatory ..	1	1	2
Sink, utility .....	—	—	1
Table, dish:			
Clean, rolled-rim edge, shelf above for 4 to 5 racks ..	1	1	—
Soiled, sink type, shelf above and below .....	1	1	1
<i>Movable—Major Equipment</i>			
Can with cover, 20-gallon capacity .....	1	2	2
Carrier, 20 x 20 inches, 1 every 4 to 10 racks .....	1	2	
Dolly:			
Can .....	1	2	2
Cup .....	1	1	2
Glass .....	1	1	1
Tray rack .....	1	2	2
Rack, dishwashing machine:			
Bowl, 20 x 20 inches, open ..	2	4	
Creamer, 6 x 10 inches, 24 compartments .....	2	4	8
Cup, 20 x 20 inches, 20 compartments .....	5	10	17
Flatware, 12½ x 6 inches, 8 compartments .....	1	2	5
Glass, 20 x 20 inches, 36 compartments .....	4	6	12
Plate, 20 x 20 inches, 9 compartments .....	3	6	
Tray, 20 x 20 inches, 8 compartments .....	3	6	
Sink, soak, two-compartment, locking casters .....	1	2	2
Truck, metal, adjustable shelves, locking casters .....		1	1



## POTWASHING

The potwashing function, centralized for purposes of sanitation and economy in labor and floorspace, may be performed manually or mechanically. The area should be convenient to the preparation and baking sections and adjacent to the cooking section since most of the pots and utensils to be washed will come from these sections. Traffic patterns must be minimized in the area. Utensils and pans from serving areas may be washed in the dishwashing room. Mobile carts help decrease traffic problems if used to pick up soiled items and distribute clean equipment to the using areas. Separate carts should be provided.

**Space Requirements.** The potwashing area for the manual operation should be equipped with a three-compartment sink, a food-waste disposer, and a minimum of a 30-inch drainboard at each end. A mechanical brush-washer attachment would help speed manual operation.

If a mechanical system is used, pots may be washed in a sink equipped with a built-in mechanical agitating device to permit easier cleaning of pans.

A dolly should be provided to wheel wastecans to the trash storage area.

Where hot water sanitization is to be used, the rinse sink should be provided with a booster heater, thermostatically controlled, to maintain proper temperature at 170° F. for one-half-minute immersion in the final rinse water. If this method is unfeasible, a solution having available a minimum of 50 ppm of chlorine in water having a temperature of not less than 75° F., or an iodine solution having available a minimum of 12.5 ppm of iodine in water at a temperature of not less than 75° F. and a pH not higher than 5.0 is recommended (18).

Each sink compartment should be 30 inches long by 24 inches wide and 12 to 16 inches deep. The sink bottom should be at least 22 inches above the floor with the front rim 36 to 38 inches above the floor. The splashback at the rear should be 10 to 12 inches high and turned back 2 inches on both top and sides to conceal water supply lines and high faucet mount-

ing. It should be sealed tightly to the overall surface to prevent vermin harborage.

Space should be provided for at least two mobile panracks to hold pots and utensils waiting to be washed and/or stored, and to avoid having the floorspace around and beneath the sink cluttered with utensils.

Two racks, 60 by 30 by 60 inches, with adjustable open shelves and locking casters, are recommended. Separate racks are desirable for clean and soiled ware. One rack, 24 by 32 by 60 inches, should be adequate to accommodate soiled ware in the 50-bed hospital.

**Equipment Arrangement.** The drainboards installed at either end should drain toward the sinks. Where mobile storage units are not provided, adequate space should be allowed for holding soiled pots at the wash end and air-drying clean pots at the other. If necessary, a mobile table should be provided for clean pots. (See fig. 8.)

Provide a slatted shelf for storage of cleaning supplies under the left drainboard.

A slanted shelf above the sink may be required for temporary rack storage of small mechanical parts.

An extra rack may be required for storing additional pots and utensils. Shelving should be open-type with adjustable shelves. A rack, 24 by 32 by 72 inches, is suitable for the 50-bed hospital, and a rack, 24 by 60 by 72 inches, should be adequate for 200-bed hospitals which serve up to 1,000 meals daily.

Pots and utensils may also be washed in an automatic spray-type pot- and pan-washing machine. This type of machine may be considered as a desirable investment, especially for the 200-bed or larger hospital where more than 1,000 meals are served daily. There are three basic types of pressure potwashing machines: batch-type, two-door pass-through, and two-tank continuous rotary table machines. A high-capacity, tunnel-type machine is also available. The semiautomatic, rack-type, single compartment for "straight-through" operation measures 31 inches, table-to-table, 39 inches overall, front to back, and 74½ inches overall height with doors closed.

**Equipment List.** The suggested equipment items listed below for this area are for a manual operation.

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
POTWASHING. ....	1	1	1
<i>Fixed Equipment</i>			
Disposer, waste, institutional size preline spray. ....	1	1	1
Heater, booster, hot water line attachment. ....	1	1	1
Partition, glass above waistcot. ....	1	1	2
Shelf, above sink. ....	1	1	1
Sink, two drainboards, 3 compartment 30 x 24 inches and 12-16 inches deep, 1 with dial thermometer. ....	1	1	1

	Suggested quantity		
	Number of beds		
	50-75	100-150	200
	A	B	
<i>Fixed Equipment—Con.</i>			
Washer, automatic, pot and pan, rack-type, single compartment. ....			
<i>Movable—Major Equipment</i>			
Can with cover, 20-gallon capacity. ....	1	2	
Dolly for can. ....	1	1	
Rack, pot, mobile, shelving, metal, adjustable, locking casters:			
24 x 32 x 60 inches. ....	1	—	
60 x 30 x 60 inches. ....	1	2	
Washer, pot and pan, mechanical brush. ....	1	1	

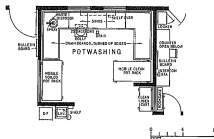


Figure 8. Potwashing area for a 100- to 150-bed hospital.

## HOUSEKEEPING—OPERATIONS AND MAINTENANCE

Facilities should be provided to hold food waste and trash, sanitize and store trashcans, clean mobile units, store equipment and supplies needed for cleaning, and maintain sanitary conditions in dietary areas. Steam cleaning outlets should be provided throughout the area.

The size of storage facilities for food waste and trash varies according to the number of days between removal of waste and trash.

Facilities for holding food waste should be refrigerated, especially where daily pickup service is not provided and where a mechanical method of food waste disposal is prohibited. Better sanitation is promoted when plastic can liners are used.

**Location.** Food waste facilities should be accessible to the outside loading platform for direct pickup of refuse without having to transport it through the receiving entrance and food production areas.

Where the same loading platform is used for receiving food and for removing trash, it should be divided. Doors opening only to the dock will permit trash pick-up during nonoperating hours.

**Space Requirement.** Hospitals which have daily trash pickup service will need only limited facilities for dietary service usage. The area for these facilities should be at least 6 by 8 feet. The size may vary with the number of cans to be stored and the number of waste disposers provided in the dietary area. (See fig. 9, p. 47.)

Waste disposers are recommended in the preparation, dishwashing, and potwashing areas. Improved methods in food production, use of convenience foods, and improved methods of disposal now make it impractical to estimate refuse yield per person or meal as a basis for determining space requirements.

Steam outlets are located strategically throughout the areas for cleaning of mobile equipment and large items.

A 10-gallon capacity wet-dry vacuum cleaner is recommended for installations of 100 beds and over.

Where a can and bottle crusher is used, space needs for cans may be decreased in the trash storage area, as empty cans are crushed to within 10 percent of their original size and dropped into the standard size waste can. Use of such equipment will save 90 percent of the labor costs of removing empty cans and bottles from the food production area to the refuse area.



The can and bottle crusher unit (24 to 26 inches wide, 28 inches deep, and 64 inches high) will occupy approximately 5 square feet. Its location should depend on use and cleaning problems involved. Some hospitals prefer to locate the unit at the point of use; e.g., in the preparation area. However, it may also be located in the trash room. Cans on dollies are removed to the refuse area.

The use of incinerators, which are required for the disposal of hospital wastes, eliminates or decreases space requirements for food waste and trash storage.

Trash chutes are not recommended for transporting waste. They are entirely unsuitable for hospital use since they harbor vermin and are a fire hazard. If chutes are used, the charging doors should be located in a well-ventilated, fireproof room. They should never be located on a corridor.

**Handling Clean and Soiled Linen and Uniforms.** A room or alcove may be needed for pickup and delivery of linen. The size of the area will depend upon how much linen is used for patient tray service and in dining facilities. A location separate from the food area should be provided for holding soiled linen. If the hospital has a laundry service for personnel uniforms, the clothing is usually issued by the linen service to the personnel as needed.

The soiled linen room and chutes should be completely separate from preparation areas.

**Design Considerations.** In planning housekeeping areas, the following factors should be considered:

1. Floor sinks should be an integral part of the floor construction in areas where mop and other cleaning items are stored. Maximum curb height should be 8 inches to accommodate water from cleaning machines.

2. Fixtures in the cart and can-washing areas should be vapor or weather proof.

3. Hot and cold water lines should be provided in the cart wash area, the trash storage area, and janitors' area; steam lines will be needed in the trash storage area. Water faucets equipped with hose connections should be provided with vacuum breakers mounted high enough to clean cans and to conform to applicable codes.

4. Floors should be sloped to conveniently located drains.

5. At the entrance into food waste and trash areas, effective measures should be taken to protect against breeding or presence of vermin, rodents, and insects (19).

6. Mechanical exhaust ventilation is required for an enclosed room; minimum requirements are 10 air changes per hour.

7. Lighting level of 30 footcandles should be provided. Surface mounted luminaires are recommended. However, the suspended type is acceptable.

**Cart and Can Washing.** Areas should be provided for washing and sanitizing carts and trash cans. The simplest can-washing method is a manual operation, using a hot and cold water hose. Cans may also be washed in an open "bird-bath" type support, mounted 16 inches from the floor. A nozzle is located in the center of the bath. Cold water and steam are needed for this type of operation. The cans to be washed are inverted over the nozzle. The outside of the cans must be cleaned with a brush. Another kind of can-washing equipment is the upright cabinet type, sized to accommodate most standard cans. This type permits both the inside and outside of cans to be washed and sanitized. Properly installed vacuum breakers should be provided on all waterlines to the can-washing equipment.

In addition, the area should be equipped with racks to permit draining and air-drying of cans; two or three shelves are needed to hold six to nine cans at an angle. Can racks should be 12 inches or more off the floor for sanitation purposes. State or local health department codes must be followed.

Space and equipment needs are decreased approximately 7 to 1 when a can and bottle crusher is employed.

**Janitors' Area.** A separate and properly ventilated area, open or closed, according to approved

safety practices, should be provided for storage of cleaning equipment such as mops, mechanical floor scrubbers, sink or receptor, buckets, and supplies. A paper towel dispenser is required. The room should not be less than 24 square feet. However, this area will increase proportionately with the size of the operation. This room should be near the trash room.

**Equipment List.** The various equipment items suggested for use in the housekeeping area are grouped in the listing below according to the preceding discussion. Some of these items may be used in other areas or may be omitted depending on the individual operation.

	<i>Suggested quantity</i>		
	<i>Number of beds</i>		
	<i>50-75</i>	<i>100-150</i>	<i>200-225</i>
<i>A B C</i>			
<b>HOUSEKEEPING—OPERATIONS AND MAINTENANCE</b>			
Janitors' Area.....	1	1	1
<i>Fixed Equipment</i>			
Dispenser:			
Paper towel.....	1	1	1
Soap.....	1	1	1
Holder, mop handle.....	2	2	2
Shelf, supply.....	1	1	1
Sink, floor.....	1	1	1
<i>Movable—Major Equipment</i>			
Truck mopping, 2 buckets, wringer.....	1	1	1
Vacuum, cleaner, wet-dry, 10-gallon capacity.....	-	1	1
Linen Storage:			
Clean:			
<i>Fixed Equipment</i>	-	-	-
<i>Movable—Major Equipment</i>			
Cart, utility, 20 x 36 inches.....	1	1	2
Soiled:			
<i>Fixed Equipment</i>	-	-	-
<i>Movable—Major Equipment</i>			
Receptacle, foot-operated, closed-top.....	1	2	2
Trash and Can Wash Room:			
<i>Fixed Equipment</i>			
Washer, can.....	1	1	1
<i>Movable—Major Equipment</i>			
Can with cover, 20-gallon capacity.....	2	4	8
Dolly for can.....	1	1	1
Rack, can, locking casters.....	1	1	1
Cart Wash Room.....	1	1	1
<i>Fixed Equipment</i>			
Outlet, steam and hot water..	1	1	1
<i>Movable—Major Equipment</i>			



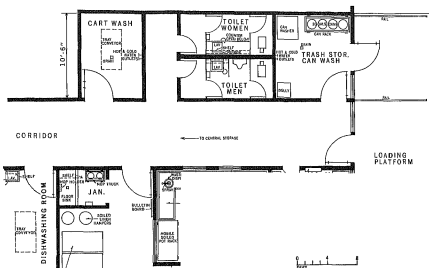


Figure 9. Cart and can washing and trash storage rooms for a 100- to 150-bed hospital.

## Chapter IV

# Ancillary Dietary Services

In determining the hospital's total dietary needs, planners should not only consider the facilities required by the central dietary service but also certain ancillary services located at various locations throughout the hospital. These ancillary services should be planned to complement the central dietary service and should be in keeping with policies governing the overall dietary program.

The type of food service required on patient care units and the special needs of the formula supply rooms should be given particular consideration. Other needs include space for vending and snackbar facilities and for icemaking operations.

This chapter presents guidelines for those responsible for planning the ancillary services.

### PATIENT CARE UNITS

Hospitals employing a centralized dietary service should provide minimal food service facilities on patient care floors during periods when central service is not available.

**Operational Aspects.** Facilities for preparation, dry storage, and refrigeration are required if the hospital serves a hot nourishment such as cereal, soup, tea, or toast in addition to juice and milk.

When meals and nourishments are transported by a vertical tray carrier or shelf-type dumbwaiter, small enclosed carts, 4- to 6-tray capacity, should be provided on the patient care floors. Trays may be distributed individually. Provisions should be made to return carts to the cart-washing area after each meal. Mobile beverage carts are designed to dispense liquid nourishments.

Where mobile dual-control tray conveyors are used, electrical outlets must be provided.

Water glasses and wide-mouth carafes should be washed and sanitized in the central dishwashing room. Carafes should be filled with ice and water on the patient care unit.

In hospitals where carafes are iced in the central tray-serving area, additional freezer storage facilities will be required. A minimum of two carafes is required for each patient bed (one in process and one in

use). Storage requirements must be planned accordingly, either in the patient care unit or in the tray-serving areas. Extra glasses may be placed on the patients' meal trays when service is centralized.

The technique used in filling the water carafe should prevent contamination of the ice and the carafe. A self-dispensing ice machine is recommended to eliminate the need for a scoop.

**Space Requirements.** The dietary facilities should



be convenient to the nursing station and patient care unit. Such facilities may consist of a compact unit including sink, burner, and a 4.5-cubic-foot-capacity refrigerator. A cabinet may be located above and below the unit for storing food and supplies. This unit would occupy 12 square feet of space.

## FORMULA SUPPLY

Three principal methods for providing formula to nursery infants are: (1) Preparation of the formula entirely in the formula room; (2) final preparation of formula in the hospital from presterilized, packaged components delivered by an outside source; and (3) use of individually packaged presterilized formula delivered by an outside source (20).

In providing formula for infants, attention must be given to facilities, personnel and their responsibilities, formula preparation, and safety standards and quality control.

**Facilities.** The type of facilities needed will depend on the method used in preparing the formula. A formula room is essential when the formula is prepared entirely in the hospital.

**Function and Location.** All feedings for all infants—newborn, low birth weight, and sick—must be

A self-dispensing icemaking machine should be provided in this area to readily supply ice for all required measures and for filling canies.

Storage space should be planned for the food carts, and, if paper cup service is to be used, storage and disposal facilities must also be considered.

prepared in the hospital formula room. No other use should be made of the room.

The room should be situated where contamination danger is minimal, distribution problems limited, communication easy, and control procedures readily instituted.

**Construction and Facilities.** Recommendations for the construction and facilities of a formula room may be found in a publication of the American Hospital Association, "Procedures and Layout for the Infant Formula Room." (See references, p. 67).

**Commercial Preparation of Formulas.** The use of prepackaged infant formulas will make a formula room unnecessary. However, a clean area for storing and dispensing the formulas must be provided. A wide variety of commercial formulas is now available.

## VENDING OPERATIONS

In addition to the food service in the hospital cafeteria, automatic food and beverage vending machines are frequently provided for patients, hospital personnel, and visitors. Apart from the convenience of self-service, vending machines constitute a certain measure of insurance against waste and pilferage.

Hospitals planning new construction or remodeling may wish to consider the advantages of installing vending machines when planning a dietary service.

**Location.** Since most hospitals will contract for this type of service, the vending machines should be located near an entrance for servicing; machine maintenance is provided in the contract. On the other hand, housekeeping of the area where machines are located will be an important hospital responsibility.

Vending machines for carbonated beverages, candy, snacks, and nuts should not be located in the cafeteria or dining areas.

**Space Requirements.** Space requirements vary according to the size of the operation and number of

machines. Essential equipment includes "standup" counters and/or tables and chairs and high capacity trash bins.

Electrical and plumbing needs should be evaluated so that adequate utilities for operation of vending machines will be provided.

Vending service owned by the hospital will require a sink, reach-in refrigerator, and storage room for the operation. The facilities should be planned in accordance with guidelines presented in "Vending of Foods and Beverages," Public Health Service Publication No. 546 (27).

**Snackbar Facilities.** Snackbar facilities should be planned around the type of service to be featured, such as beverages, sandwiches, and fountain specialties.

Facilities for frying, grilling, and toasting may be placed behind the counter where space is limited. Refrigerated facilities will be required for perishable items such as hamburgers, salads, and sandwiches.

## ICEMAKING

The manufacture and distribution of ice within the hospital have a direct bearing on the effort to insure proper sanitation. Close supervision of both operations is essential.

Wherever possible, icemaking should be decentralized. To eliminate sources of contamination, self-dispensing icemaking machines should be provided in each area where consumption is warranted.

Where it is necessary for ice to be manufactured, stored, and distributed from a central point, the machine should not be located in the food production area. The hospital should provide a separate area with sanitation safeguards comparable to the food production area, and convenient to all departments.

Space must also be considered for storing and sanitizing carts that are used to distribute ice to the various areas. Additional carts and scoops will be required.

If the machine is not self-dispensing, proper techniques should be employed in handling the scoop.

**Location.** Icemaking machines are usually located on patient floors and also in the food production or serving areas. Those on patient floors should be preferably in the dietary facility in the central block of the patient care unit. This area is sometimes referred to as the nourishment room.

In the dietary department, the icemaking machine should be away from areas with intensive heat or heavy traffic. It should be located in such a manner that hot air may be carried away and icemaking capacity maintained. It should be placed near the area of greatest demand, usually near either the salad section or the cafeteria.

Some hospitals feel the demand for ice is greater in the cafeteria than in food preparation, especially near the beverage stations where iced drinks are to be served. A self-dispensing machine provides the most sanitary method of handling ice at that location.

Ice needed in other areas within the dietary department may be transported from the cafeteria if demand is not excessive.

**Estimating Requirements.** For planning purposes, approximately 6 pounds of ice per bed per day may be estimated for each patient care unit.

The capacity of an icemaking machine is estimated on the amount of ice which can be manufactured and

stored during a 24-hour period. A machine 28 to 38 inches wide and 24 to 30 inches deep can produce about 250 to 300 pounds of ice daily for a 50-bed hospital. This size is recommended for the patient care unit. The amount of ice needed daily by the food service operation will vary with the type of service.

In installations with a cafeteria operation, the maximum daily ice requirement for the total dietary department is approximately 4 to 6 pounds per person per meal.

Facilities near tray and cafeteria serving lines for refrigerating and displaying perishable items and iced beverages determine the amount of ice required.

Ice needs are reduced when patient tray serving lines include refrigerated serving units or when refrigerators are placed near the serving lines.

In the cafeteria, the cold "bain-marie" is gradually being replaced by counter-type refrigerated pans for displaying perishable foods. These pans eliminate the need for filling and emptying ice pans for each meal. Many cafeteria operators contend that food is made more appealing when displayed on banks of ice. For such purposes, flake ice is preferable to cubes or rectangle.

**Space Requirements.** Floor space for various types of icemaking machines, including the dispensing type, are based on various capacities as follows: 500 pounds, width 37 to 50 inches, depth 26 to 32 inches; 1,000 pounds, width 72 inches, depth 30 inches; and 2,000 pounds, width 80 inches, depth 48 inches.

**Equipment List.** An equipment list for the icemaking room follows:

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
	A	B	C
ICEMAKING.....	1	1	1
<i>Fixed Equipment</i>			
Icemaking machine, automatic,			
self-dispensing:			
500-pound capacity.....	1	—	—
1,000-pound capacity.....	—	1	—
2,000-pound capacity.....	—	—	1
<i>Movable—Major Equipment</i>	—	—	—

# Office and Personnel Facilities

Office space and personnel facilities such as lockers and lounges must be designed for both efficiency and comfort. Special attention should be given to their

size and location so that they will be readily accessible from related areas and large enough to accommodate the anticipated traffic flow.

## OFFICE

Hospital dietary departments require an office where the following administrative functions can be performed: planning and checking menus for regular and modified diets, keeping necessary records, and conferring with personnel, professional staff, and vendors.

**Location.** In large hospitals, the office for the administrative and the chief dietitian is located near the offices of the administrator, the medical director, and the director of nurses to facilitate communication with the department heads and the medical staff.

An office should be provided for a therapeutic dietitian on the patient care floor near physicians, nurses, and patients' area.

An office must be provided for the food production dietitian or food manager, preferably near the food preparation and tray service sections to permit quick observation of the operation if indicated. It should be enclosed on two sides with glass.

Space should be provided in the office for a clerical worker and at least one food service worker who may be assigned to chart food orders, and it should provide access from the corridor. Provision may need to be made for personnel engaged in food costing operations.

An office for the chef should be provided in hospitals with more than 200 beds. Desk space should be provided in a separate alcove for the chef in hospitals with more than 100 beds.

**Space Requirements.** Offices should be equipped for the number of persons who will be expected to use them at one time, and for the types of work to be performed. (See fig. 10, p. 52.) A pneumatic tube outlet in the food production office will facilitate service by forwarding diet requests from patient care floors. Possible mistakes made when requests are handled by telephone will be eliminated. If a pneumatic tube is not desired, a tape recorder telephone may be useful.

**Equipment List.** The various equipment items suggested for use in the office for the food production area have been grouped below according to the preceding discussion. Equipment is also included for an office for the chef in the 200-bed hospital and provision is made for the chef's desk and chair in the 100-bed hospital.

	<i>Suggested quantity</i>		
	<i>Number of beds</i>		
	<i>50-75</i>	<i>100-150</i>	<i>200-225</i>
	<i>A</i>	<i>B</i>	<i>C</i>
OFFICE.....	1	1	2
<i>Fixed Equipment</i>			
Board, bulletin, 26 x 24 inches.....	1	1	1
Counter, open below.....	1	1	1
Panel, glass.....	2	2	2
Pneumatic tube station.....	-	1	1
<i>Movable—Major Equipment</i>			
Bookcase.....	1	1	1
Cabinet, filing:			
Card size, 5 x 8 inches, 2 drawers.....	1	1	1
Letter size, 5 drawers.....	1	1	2
Calculator, listing.....	1	1	1
Case, map, for holding large educational material.....	1	1	1
Chair:			
Office, swivel, arms.....	1	1	2
Straight.....	2	3	4
Desk, office, single pedestal.....	1	2	3
Lamp, desk.....	1	1	3
Locker, clothes, steel, 15 x 10 x 60 inches.....	1	1	2
Stand, typewriter, 18 x 18 inches.....	1	1	1
Table, 24 x 42 inches.....	1	1	1
Typewriter.....	1	1	1

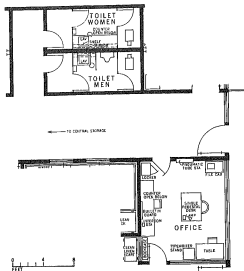


Figure 10. Dietary office and personnel facilities for a 100- to 150-bed hospital.

## PERSONNEL FACILITIES

Hospitals should provide separate facilities for service personnel to include locker and lounge areas, toilets, lavatories, and showers. In hospitals having more than 100 beds, separate locker facilities for dietary service personnel should be considered. Space requirements for these should be based on the size of the operation and the number of workers who use it at one time. Separate facilities should be near the personnel entrance to the food production area.

The location of all locker and lounge areas should permit frequent and easy surveillance by a supervisor. A locker should be provided for each worker. The locker height should permit the longest garment to hang straight without wrinkling. Locker dimensions of 12 by 18 by 60 inches are considered minimum.

When space is minimal, small lockers for pumes and racks for coats may be considered.

Since health laws prohibit smoking in food preparation and serving areas, a lounge is desirable. The space required depends on scheduling of workers and the

hospital policies. Benches or chairs should be provided for workers to change shoes. A lavatory is desirable.

Many hospitals recommend the use of dining areas for a coffee break to discourage lounging in the locker room.

Separate toilet and lavatory facilities for each sex should be located near the work areas. The facilities should be separated from food areas by a hallway or vestibule. The lavatory, with mixing faucet, should be placed near the door so as to encourage handwashing before leaving the room.

Shower facility requirements are influenced by the climate and kind and conditions of work. Experience has demonstrated that showers are seldom used in localities where cool weather prevails, the work areas are well-ventilated, and the workers have good facilities at home. Hot-water storage needs must be considered. Toilet facilities should be provided in accordance with section E—part 4 of the Food Service Sanitation Manual, 1962, page 61, (13).

State and local regulations usually require:

- 1 lavatory per 20 persons.
- 1 drinking fountain per 50 persons.
- 1 water closet per 20 females.
- 1 water closet per 25 males.
- 1 urinal per 25 males.

**Equipment List.** An equipment list for the toilet rooms follows:

Suggested quantity			
Number of beds			
50-75	100-150	200-225	
A	B	C	

#### PERSONNEL FACILITIES

Men's Toilet.....	1	1	1
<i>Fixed Equipment</i>			
Dispenser:			
Paper Towel.....	1	1	1
Soap.....	1	1	1
Fixture, toilet paper.....	1	1	1
Lavatory.....	1	1	1
Light above lavatory.....	1	1	1
Mirror above lavatory.....	1	1	1
Partition, metal, 1 foot above floor.....	3	3	3

Suggested quantity			
Number of beds			
50-75	100-150	200-225	
A	B	C	
<b>Mess's Toilet—Continued</b>			
<i>Fixed Equipment—Continued</i>			
Shelf above lavatory.....	1	1	1
Urinal.....	1	1	1
Water closet.....	1	1	1
<i>Movable—Major Equipment</i>			
Receptacle, waste, foot-operated closed top, paper towel... ..	1	1	1
Women's Toilet.....	1	1	1
<i>Fixed Equipment</i>			
Counter, 30 inches high, open below.....	1	1	1
Dispenser:			
Paper towel.....	1	1	1
Soap.....	1	1	1
Fixture, toilet paper.....	1	1	2
Lavatory, counter.....	1	1	1
Light above lavatory.....	1	1	1
Mirror above lavatory.....	1	1	1
Partition, metal, 1 foot above floor.....	2	2	3
Water closet.....	1	1	2
<i>Movable—Major Equipment</i>			
Receptacle, waste, foot-operated closed top, paper towel... ..	2	2	3

## Architectural and Engineering

Hospital dietary facilities require a functionally planned layout for an efficient operation. To promote flexibility in layout, to control construction costs, and to permit maximum utilization of labor and space, the design should give particular attention to those features which provide for centralization of services and

automation. New developments require consideration.

Fluctuation in use of space can be expected as the result of continuing technological advances in food, equipment, and techniques. Therefore, adaptability to change must always be considered in planning the layout.

### HOSPITAL DESIGN

Dietary facilities should, when possible, be planned around the central core of the hospital since the tray distribution system influences the structural design.

The design should provide accessibility to central stores for general deliveries and a convenient method for transporting food to patients and personnel. Grade level deliveries may be made at ground or first floor levels. Horizontal or vertical transportation should be provided for trays near the tray service area. Dumbwaiters, mechanized vertical tray carriers, and elevators may be used in combination.

The relationship of work areas to good workflow is a basic consideration in food production areas. The flow of food supplies from receiving to preparation, service to both patient and personnel, and activities associated with warewashing, and disposal and storage of waste are shown in figure 11.

For economy and efficient use of personnel and space the layouts shown in figures 12 to 14 were designed around a central system of food preparation, tray serving, dining, and dishwashing. The equipment is intended to meet specific requirements for newer methods of purchasing, handling, preparing, and serving of foods.

**Receiving.** The general loading platform indicated on all three layouts was designed to accommodate central stores as well as the dietary department. Separate platforms may, in some instances, be required because of location of central stores in relation to the

dietary department. The separate receiving entrance shown as part of the dietary department could be eliminated where a central receiving system operation serves all departments.

In larger installations where quantity bulk produce requires pre-preparation, a sink-type waste disposal should be provided in the receiving area.

**Storage.** Day storage was allocated only for a minimum 3½-day food supply. General food storage for 30 days, not shown on the plans, should be provided in central stores plus space for nonfood supplies. The mobile adjustable shelving indicated will minimize delivery and handling, and will promote orderliness and accessibility. Carts and trucks are recommended to facilitate the movement of supplies between storage, preparation, and service.

Reach-in refrigerators only were used in hospitals with fewer than 200 beds. Sliding door, undercounter, and pass-through types along with mobile shelving for food files were used and located at the "point of use" for flexibility and to accommodate newer food packaging.

The prefabricated walk-in refrigerator, shown in figure 14, allows for increased storage requirements and possible future relocation or expansion.

**Food Preparation.** The facilities for cooking, baking, and salad preparation, as shown in figures 12 to 14 could be decreased and some major items of equipment eliminated when hospitals are planning to pur-



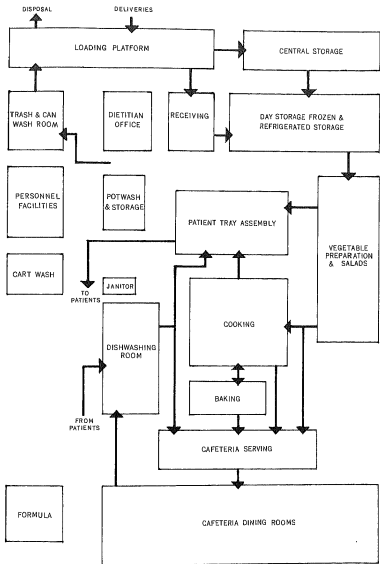


Figure 11. Flow diagram of food from receiving to service.

chase nearly all foods in ready-to-eat-or-cook forms.

The location of the salad preparation area permits easy access to the cafeteria as well as the tray setup area.

In installations not purchasing prefabricated meat, additional workspace and refrigerated facilities will be required.

Facilities for preparation of nourishments and modified diets may be separate areas depending on needs.

Although the layouts were planned around the conventional type of food service, the use of convenience foods and electronic cooking equipment were considered. Electronic cooking equipment may be preferred instead of conventional cooking equipment. In such a case, space requirements will be affected. Refrigerated storage will increase and cooking equipment needs will decrease accordingly.

The bake area may be reduced or entirely eliminated depending on the amount of baked goods that are purchased.

**Tray Assembly.** The tray assembly layout is based on the menu, personnel, number and arrangement of mobile food-holding units, and access to the cooking area.

Heated lead discs are used to maintain food serving temperatures and to meet anticipated situations such as distance and time lag. (See figs. 13 and 14.)

In addition to mobile tray conveyors and/or the vertical tray carrier, a shelf-type or floor-level dumbwaiter may be provided exclusively for transporting nourishments and for handling special requests to the patient care floors. Where the distribution system uses dumbwaiters only, separate shafts should be provided for handling clean and soiled trays. Newer techniques for cleaning shafts for dumbwaiters and vertical tray carrier systems are recommended.

The mobile tray conveyors and vertical tray carriers were used to illustrate different transportation methods for use in multi-story hospitals. Vertical tray carrier installations require easy accessibility for servicing,

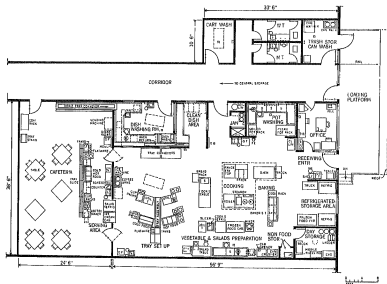


Figure 12. A centralized dietary department serving 80 to 125 meals at peak noon period. (For hospitals in a 50- to 75-bed range.)

cleaning, and adequate firestopping to prevent the spread of smoke and fire throughout the system. Particular attention should be given to areas concealed beyond finished walls and above finished ceilings.

**Dining—Cafeteria.** Where approximately 15 percent of the average daily patient census consists of ambulatory patients who can go to the general dining area, three sittings should be scheduled instead of two. Facilities may need to be enlarged if there is a large number of wheelchair patients.

Provisions are made in the cafeteria layouts to accommodate minimal automatic food and beverage vending services. Where self-service is preferred for beverages, urns may be placed on the serving line.

In figure 14, folding partitions are used to divide the dining area to allow for private dining, for conferences, or for patient service. A mobile dish cart should be provided to transport soiled ware from the private dining area to the horizontal belt into the dishwashing area.

**Dishwashing.** Activities associated with the handling of clean and soiled ware are completely separated in adjoining rooms to promote better sanitation.

The clean dish room for the 200-bed hospital is enclosed to help decrease noise and steam. In smaller hospitals, the rooms may be partially enclosed to allow easy access for mobile units in a limited area. However, they can be fully enclosed.

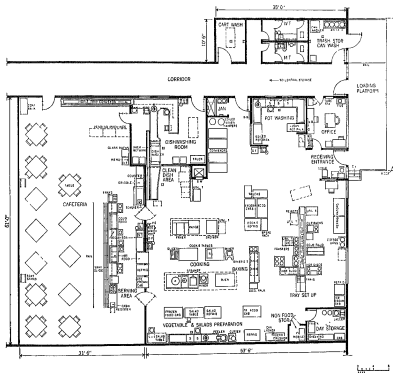


Figure 13. Centralized dietary department serving 180 to 280 meals at peak noon period.  
(For hospitals in a 100- to 150-bed range.)

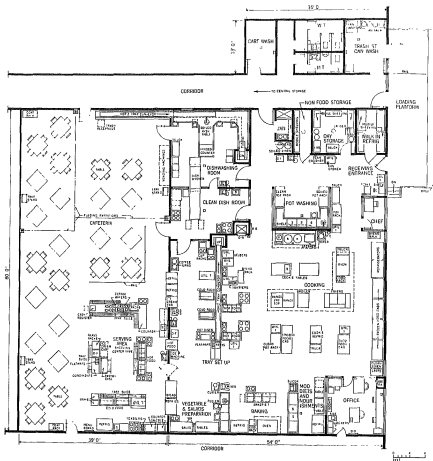


Figure 14. Centralized dietary department serving 380 to 430 meals at peak noon period.  
(For hospitals in a 200- to 225-bed range.)

The soiled dish table shown in figure 14 is designed with a hinged section to allow continuous flow from the scrapping operation to loading, and to permit freedom of passage by personnel.

A rack conveyor-type dishwashing machine may be preferred to the rackless type. In this case, a rack return installation should be provided.

Where mobile tray conveyors are used, the separate enclosed mobile carts provided for returning trays to the dishwashing area are washed and sanitized in a separate cart washing area before being returned to patient care floors. Mobile tray conveyors are also sanitized in the separate area and wheeled to a designated parking space near the serving area. Clean ware is returned directly in mobile dish storage-dispensing units to patient tray setup and cafeteria.

General stores will provide additional storage space for tableware replacements.

**Potwashing.** Separate storage space is provided in the potwashing area for mobile, tiered, clean pan, and utensil storage racks which are used to store and distribute clean ware to individual work centers. A similar rack is provided to collect soiled ware. An additional storage rack is shown near the baking area in figure 14. Revolving portable or stationary pot racks may be substituted for the mobile racks. Where mechanical potwashers are preferred, a soak sink is required. Relight windows and the U-shaped arrangement of this area provide more space and a pleasant atmosphere. The location selected will allow direct movement to the trash storage area.

**Housekeeping.** Where a disposal system is inadequate or trash collection is infrequent, refrigerated facilities must be provided in trash storage areas.

**Office.** Built-in counter-type desks may be used in place of standard office furniture especially where space is at a premium. Additional space for an ad-

ministrative dietitian must be provided in the administrative services department.

**Space.** Table 11 presents a breakdown of square-foot floor areas required by the various work areas within the dietary facilities of hospitals having from 50 to 225 beds, illustrated in figures 12, 13, and 14.

Table 11. Areas in dietary facilities

(The areas shown below are based on the size of equipment and the exigencies of each plan. Therefore, the areas indicated are not comparable in each bed-size range.)

Net areas in square feet	Size of hospital		
	50-75 bed range	100-150 bed range	200-225 bed range
Receiving.....	65	83	200
Storage:			
Refrigeration.....	110	145	275
Dry.....	75	85	115
Nonfood.....	10	20	50
Food production: Preparation, cooking and baking.....	840	1,625	1,850
Serving:			
Patient trays.....	540	575	750
Cafeteria			
Serving.....	170	375	755
Dining.....	770	1,480	2,405
Dishwashing.....	270	420	600
Potwashing.....	100	135	180
Cleanwashing, trash storage.....	90	105	150
Cart wash.....	80	80	100
Janitors' area.....	25	25	30
Office.....	115	130	195
Personnel facilities, toilets.....	120	120	155
Total.....	3,380	5,405	7,770

## ARCHITECTURAL PLANNING CONSIDERATIONS

Mobile equipment items offer many advantages. Extensive use of carts, mobile units, and other portable equipment contributes to ease of operation and greater flexibility in planning the food production area.

Equipment and supplies located conveniently to the worker save unnecessary and costly steps. Adoption of industrial engineering techniques into a food service operation increases efficiency in preparation and

service. Technological changes and economic trends should also be continually evaluated when space presents planning problems.

Layouts illustrating the implementation of these techniques and those outlined in this text should be used only as a guide to assist the architect in meeting the program developed by the planning committee.

## COMMUNICATIONS

Hospitals should have an intercommunication system between the dietary department and other departments of the hospital.

In hospitals with under 100 beds, it may be a telephone or "intercom" system. In hospitals with over 100 beds more complex service will be required by the department. Communication needs may justify direct connection between cafeteria, patient care floors, central stores, purchasing, laboratory, housekeeping and maintenance departments, and administrative services. Interconnecting telephones usually provide satisfactory service within and between major service departments. However, in hospitals of approximately 200 beds and larger, an independent intercommunicating system may be needed.

Pneumatic carrier tubes are frequently used to carry diet prescriptions and other orders to the dietitian's office, and to avoid errors on telephone or "intercom."

Depending on the size, layout, and relation of the food production center to the patient tray setup and cafeteria, some form of communication is always necessary.

An intercommunication system which serves the food production center and the dietitian's office will save personnel time and expedite service.

The location of speaker-microphone units of the intercommunication system should be near the tray-serving area and also conveniently accessible to others in the dietary service area.

If the operation serves over 500 meals, the communication system may need to be extended. For example, a selective dial system with a capacity up to nine stations may be installed by the telephone company according to the needs of the individual operation. If the needs exceed the telephone setup capacity, a microphone and station switch for supplementary services can augment the system.

Some hospitals are now equipping various work stations in the food production and service areas with means of audio-communication for supervising and teaching.

Regardless of the size of the dietary department, the communication system must be an integral part of the total dietary plan if the department is to operate at maximum efficiency.

## ELECTRICAL—LIGHTING

Electrical requirements for food preparation and cooking facilities vary greatly with the amount, capacity, and types of electrical equipment used.

Electrical installations and working space surrounding electrical equipment must comply with recommendations of the National Electrical Code. Equipment should be listed as complying with applicable standards of Underwriters' Laboratories, Inc., or should meet other similarly established standards.

Equipment layouts should show the location of all electrical consuming devices and their electrical requirements such as watts, voltage, and phase. Similar information on portable electrical equipment included in the planning should also be given. A common complaint in service areas is an insufficient number of receptacles of appropriate voltage and capacity at the "point of use" for various kinds of portable equipment, such as toasters, urns, and heated and refrigerated food holding units.

The electric power for new installations should have sufficient capacity to permit some additional equipment to be added without overloading the system.

Lighting should conform to current recommendations of the Illuminating Engineering Society and should be as glare-free as practicable. Incandescent filament lamps or fluorescent lamps of one of the warm colors are recommended for food display areas. The warm color characteristics produced by these lamps tend to make the food displays more appealing. In food service areas, current recommended illumination levels vary from 30 to 100 footcandles (fc); inspection, checking, and pricing, 70 (fc); cashier, 50 (fc); food display, 70 (fc); baking and mixing room, 50 (fc); meat cutting and grinding, 100 (fc).

Reflectances recommended to obtain a satisfactory balance of brightness in food service facilities are: ceiling—80 percent, walls—60 percent, equipment—25 to 30 percent, and floors not less than 15 percent (22).

Luminaires should have a minimum of 30 degrees shielding to reduce glare, and should be of a type easy to clean and relamp. When installed above steam-producing equipment, they should be of vapor-tight construction.

## VENTILATION—AIR CONDITIONING

A comfortable and a sanitary environment should be a fundamental requirement for modern hospital dietary facilities. Where such an environment is to be maintained, the ventilation or air-conditioning system is an indispensable element.

With the increasing use of air conditioning in modern construction, personnel comfort is assuming greater importance, not only as it affects efficiency of operation, but also as a major economic factor in the reduction of personnel turnover.

Comfort in the dietary facility depends primarily upon the maintenance of reasonable temperatures and humidities.

Physical location of the dietary facilities as well as the geographical location of the hospital will influence decisions regarding the type of system to be installed: ventilation only or a complete air-conditioning system. The same care in design is required for either system to maintain satisfactory working conditions.

### Ventilation Design

The ventilation system must be designed to contribute to physical comfort and sanitary conditions. It must provide environmental conditions to reduce overheating and at the same time capture and remove heat, steam, grease, and odor at the point of origin.

Byproducts of cooking, when improperly controlled, spread and eventually condense and deposit on all surfaces. This endangers the food supply and results in unsightly walls and ceilings. These deposits must be meticulously removed from the surfaces or such contamination will produce an unsanitary environment.

To properly design the system, each area of the facility must be considered from the standpoint of the functions carried out and their effects upon the environment. Environmental conditions to be maintained for personnel comfort and sanitation should also be determined.

**Design and Installation Criteria.** To insure satisfactory ventilation, a qualified mechanical engineer should design the system and prepare operation and maintenance instructions for the hospital personnel responsible for these functions.

The following basic fundamentals of design contributing to successful ventilation must be considered by the sponsor and designer:

1. Each volume of air removed from the facilities by the ventilation system must be replaced by the sys-

tem with an equal volume of properly filtered and tempered outdoor air.

2. Mechanical methods should be used for all air-handling systems. Gravity systems or open doors or windows should not be relied upon for air supply and exhaust.

3. The fresh air supply inlet to the facilities should be located above ground level to avoid the possibility of entraining local contamination, and must be away from any ventilation or combustion equipment exhaust outlets. The inlet should be screened against insects and shielded from rain.

4. Filters installed in fresh air inlets should have a minimum efficiency of 80 percent. Filter efficiencies should be based on the National Bureau of Standards Dust Spot Test Method on atmospheric dust.

5. The quantity of outdoor air required for ventilation may be dictated by the quantity required to be exhausted through the various equipment hoods. It should not be less than 20 air changes per hour.

6. Air should not be recirculated within the food preparation area. A portion of the air may be exhausted through such areas as the dishwashing room, but should be exhausted to the outdoors. All exhaust outlets should be located as far as possible from any ventilation air inlet. Outlets should not create a nuisance to other hospital areas or the community.

7. All air movement within the facilities should be controlled. The air from areas producing heat and contamination should not move into less contaminated areas, such as from dishwashing to food preparation. However, the air from clean functional areas may serve as makeup air for less clean areas.

8. Care should be exercised to eliminate air movement between the food preparation areas and other areas served by transportation systems such as dumbwaiters and vertical tray carriers.

9. Where dietary and other service areas, such as laundry and storage, are near each other and open onto a common traffic corridor, the ventilation system must be balanced to prevent air infiltration from corridors or other areas into the dietary areas.

10. Temperatures and humidities will preferably not exceed 80° F. and 50 percent relative humidity or an equivalent effective temperature.

11. All equipment and appliances which produce heat, steam, grease, or odor should be equipped with hoods or their equivalent to capture and exhaust such byproducts to the outdoors.

**Hoods.** Hoods are required for ovens, griddles, fryers, ranges, broilers, steam cookers and kettles, rotary toasters, dishwashing machines which do not have integral ventilation systems, and for large capacity food waste disposal units.

All hoods should be mounted approximately 6 feet 3 inches above the floor and should extend a minimum distance of 8 inches on all open sides beyond the equipment served.

Hoods serving equipment such as griddles, fryers, and ranges which produce a greasy aerosol should have minimum depth of 24 inches to facilitate capture of these byproducts and to accommodate grease filters.

Lower edges of all hoods should be designed with a gutter to collect grease dripping from the filters.

The following face velocities are recommended for the air at the hood entrance (23) :

Type of hood	Number of exposed sides	Air velocity across face of hood (minimal feet per minute)
Central hood.....	4	150
Wall hung.....	3	100
Corner hung.....	2	85
Apron on 3 sides.....	1	85

**Filters.** Filters should be installed in the hood at an angle to the cooking surface and tightly fitted to prevent air leakage between filter segments or the holding frame. They should be exposed in the hood to facilitate inspection, removal, and cleaning.

Grease filters must be installed in certain hoods to eliminate accumulation of grease in the exhaust air duct system. Such an accumulation represents a highly potential fire hazard.

An increase in resistance to airflow through the filters occurs as filters become loaded with grease, dust, and other particulates. This results in decreased airflow through the hood and an unsatisfactory installation unless compensated for by a suitable fan.

Where equipment permits, the hospital should consider selecting filters which may be cleaned in the dishwasher. Cleanable grease filters fabricated of wire mesh, 2 to 3 inches thick, are

The exhaust air duct  
fabricated of non-  
ferrous metal and  
be welded or  
bolted and drained at

a convenient location to prevent condensed vapors from collecting in the hood.

Horizontal exhaust air ducts should be provided with access doors at 20-foot intervals to provide openings for inspection and cleaning.

Exhaust systems serving grease-producing functions should be equipped with thermostatic controls to shut off the fans in case of an excessive temperature buildup or fire in the ductwork.

Carbon dioxide or live steam for smothering grease fires should be piped into the throat of the hood where it connects to the exhaust duct system. The controls for activating these systems should be located adjacent to the equipment.

A portable carbon dioxide extinguisher should be provided to control fires originating at the cooking level.

Vertical exhaust air ducts carried up through the building for exhaust above the roof must be encased in a continuous type shaft constructed of at least the equivalent of 4 inches of hollow tile.

## Application of the Ventilation System

Installation of the ventilation system requires specific application to major areas. Listed below are areas which present individual problems, and therefore require special consideration.

**Food Production Area.** The food production area should be maintained at a positive air pressure relative to the air pressure of the potwashing area and dishwashing room, and at a pressure equal to that of adjoining corridors.

The food production area is the most difficult to ventilate. Fresh outdoor air should be brought in at the ceiling or high on side walls. The fresh-air inlets should be located preferably at clean areas; the air should move toward the outlets serving the heat-producing equipment and areas such as potwashing and dishwashing.

Fresh-air inlets should not be located so that entering air is directed toward the food and tray service lines, thus affecting the food temperature.

**Dining Room.** As a precaution against possible contamination, air from the dining room should not be exhausted through the food preparation areas. Ventilating air-supply inlets should be located on the dining room ceiling with exhaust-air outlets located on the side walls near the floor.

Provision should be made to remove heat and steam from above serving tables holding and display-



ing food and for other heat-producing appliances such as coffee urns and griddles.

**Dishwashing Room.** Dishwashing activities create a hot humid environment which is further contaminated by the aerosol produced by food waste disposal units.

To maintain a satisfactory and sanitary environment, it is necessary to design and locate the ventilation system with adequate air-supply inlets and exhaust-air outlets within the room. A ventilation rate of 10 air changes per hour and a negative air pressure are recommended for this area.

**Dietitian's Office.** The dietitian's office should be completely enclosed to provide privacy and to isolate it from the activities and resultant noises of the preparation area. To provide comfort in this enclosed space, both an air-supply inlet and an air-exhaust outlet should be located within the room.

Temperature conditions within the comfort zone are recommended along with an office air pressure higher than that of adjoining areas.

**Toilet and Locker Facilities.** The toilet and locker facilities should be ventilated at a rate of 10 air changes per hour and should be maintained at a negative air pressure relative to the air pressure of adjoining areas.

## *Air Conditioning*

Air conditioning has become an accepted standard for most areas of the hospital, and a very definite trend toward the air conditioning of dietary facilities is evident in many modern hospitals. Air conditioning with properly controlled air movement patterns is recommended. These systems not only reduce costly personnel turnover by providing a comfortable environment but also contribute to efficiency of operation and the sanitation of the area.

Where air conditioning is to be installed, considerable economy can be effected by careful design of the system. To provide conditioned air in the quantities required to ventilate the hoods over heat-producing equipment would be prohibitively costly in most installations. To avoid using conditioned air for this purpose, filtered outdoor air untreated except for tempering required during the winter season may be introduced directly from the outdoors at or in the vicinity of such hoods. This air would provide the greater part of the air required for the hoods. To supplement this hood ventilation system, a separate air-conditioning system should be installed to provide desired temperature conditions.

## Appendix

# Dietary Service Equipment

When dietary service facilities are planned, food, equipment, and supplies should be located conveniently and in close relation to each work area.

The equipment lists presented in chapters II-V for each of the areas planned are illustrated, in large meas-

ure, by the schematic plans which appear in chapters II, III, V, and VI. The lists should be used judiciously, since variations in requirements may arise as local programs and plans differ from the guide plan presented.

## EQUIPMENT CLASSIFICATIONS

The term "equipment," as used in this publication, means all items necessary for the functioning of all services of the facility with the exception of items of current operating expense. Equipment is classified into two groups based on the usual methods of purchase and on suggested accounting practices relating to depreciation.

**Fixed Equipment (Formerly Group I).** Equipment which is built-in or otherwise attached to the building and usually included in construction contracts (examples are dishwashers, vertical tray carriers, steam cooking equipment).

**Movable Equipment (Formerly Group II and III).** Major (depreciable) equipment having a life of five years or more (examples include reach-in refrigerators, serving tables, mobile tray conveyors, dining chairs, and tables); and minor (nondepreciable) equipment having a life of less than five years, normally purchased through other than the construction contracts (examples include tableware and serving utensils).

**Equipment List.**—The following equipment items are suggested for hospitals having from 50 to 225 beds.

[Note: A "blank" under the column, "suggested quantity," in the equipment list, indicates that the item is required but the quantity is not determined. The quantity is determined upon correlation of schematic plans. The dash (—) indicates that the item is not applicable to the particular area.]

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
	A*	B†	C‡
<b>Movable—Minor Equipment</b>			
Miscellaneous			
Beater, rotary, manual, commercial type.....	1	2	4 ea.
Board, cutting, hardwood or synthetic material, 10 x 16 x ¾ inches.....	1	2	2 ea.
Brush:			
Pastry.....	1	1	1 ea.
Pot.....	2	2	3 ea.
Urn.....	1	2	3 ea.
Vegetable.....	6	6	6 ea.
Cannister, assorted sizes.....	1	2	4 sets
Casserole, individual.....	9	10	25 doz.
Chopper:			
Food, hand.....	1	1	1 ea.
Meat, manual, 3-pound capacity.....	1	1	1 ea.
Colander, metal, 16 inches.....	1	1	1 ea.
Corer, peeler.....	2	2	2 ea.
Cup:			
Custard.....	12	25	50 doz.
Measuring, metal:			
1 cup.....	4	6	6 ea.
1 pint.....	2	3	4 ea.
1 quart.....	4	6	6 ea.

See footnotes at end of list.

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
	A*	B†	C‡
<b>Miscellaneous—Minor Equipment</b>			
Miscellaneous—Con.			
Cutter, metal:			
Biscuit.....	2	2	3 ea.
Doughnut.....	1	1	2 ea.
Slicer, rotary, manual, slicing, shredding, or grating cone type.....	1	1	1 ea.
Dispenser:			
Flatware, counter type, 4 compartments.....	1	—	— ea.
Napkin.....	1	1	2 ea.
Extractor, juice, manual.....	1	1	1 ea.
Fork, cork:			
12 inches.....	2	2	2 ea.
14 inches.....	1	1	2 ea.
20 inches.....	—	1	1 ea.
Funnel, metal, one-half to 1 quart capacity.....	2	4	4 ea.
Holder, tray card.....	5	10	20 doz.
Knife:			
Boning, 6-inch blade.....	1	1	2 ea.
Bread, serrated, 10-inch blade.....	1	1	1 ea.
Butcher, 12-inch blade.....	1	2	2 ea.
Chopping or mincing, double blades.....	1	1	1 ea.
French, 10-inch blade.....	2	2	2 ea.
Grapefruit.....	2	2	2 ea.
Paring.....	6	12	18 ea.
Sabotier, heavy, 14-inch blade.....	1	1	1 ea.
Slicing:			
12-inch blade, electric.....	1	1	1 ea.
14-inch blade.....	1	1	1 ea.
Ladle, stainless steel:			
2 ounces.....	2	2	2 ea.
4 ounces.....	3	4	4 ea.
6 ounces.....	2	2	3 ea.
8 ounces.....	2	2	3 ea.
16 ounces.....	2	2	3 ea.
Machine, petty manual.....	1	1	1 ea.
Masher, heavy duty.....			
Mold, small, diameter 3 inches.....	10	20	40 doz.
Opener:			
Bottle, manual.....	2	2	2 ea.
Can, manual.....	3	4	6 ea.
Table model, heavy duty, adjustable.....	1	2	3 ea.
Pin, rolling, hardwood, heavy-duty, revolving handle.....	1	2	2 ea.
Pitcher, metal, 3-quart capacity.....	6	6	6 ea.
Scoop, metal with handle:			
32 ounces.....	1	1	2 ea.
Disher, spring type:			
No. 6, 3/4-cup capacity.....	1	2	2 ea.
No. 8, 1/2-cup capacity.....	1	2	2 ea.
No. 10, 3/8-cup capacity.....	1	2	2 ea.

See footnotes at end of list.

	Suggested quantity		
	Number of beds		
	50-75	100-150	200-225
	A*	B†	C‡
<b>Miscellaneous—Minor Equipment</b>			
Miscellaneous—Con.			
Disher, spring type—Con.			
No. 12, 1/2-cup capacity.....	1	2	2 ea.
No. 16, 1/4-cup capacity.....	1	2	2 ea.
No. 20.....	1	2	2 ea.
No. 24.....	1	2	2 ea.
No. 50.....	1	2	2 ea.
Scraper, bowl, flexible, non-metallic blade, 7 inches wide.....	6	12	10 ea.
Shaker, large:			
Pepper.....	3	6	12 ea.
Salt.....	3	6	12 ea.
Shears, steel, 8 inches.....	1	2	2 ea.
Slicer, egg.....	1	1	1 ea.
Spatula, baker, 10 inches.....	3	4	6 ea.
Spoon:			
Measuring, graduated, 1/4 teaspoon to 1 tablespoon.....	2	2	2 doz.
Mixing, 15 inches.....	2	3	4 ea.
Serving, stainless steel:			
Perforated or slotted, 13 1/4 inches.....	4	4	6 ea.
Solid, 11-13 inches.....	2	2	3 ea.
Thermometer, food, stainless steel.....	2	2	2 ea.
Tongs, serving, 9-12 inches.....	2	4	4 ea.
Turner, pancake.....	2	4	4 ea.
Whip, wire.....	1	1	2 ea.

#### Utensils—Cooking and Baking and Serving

<b>Boiler, double with cover:</b>			
7-quart.....	1	1	2 ea.
11-quart.....	1	2	2 ea.
<b>Bowl, mixing, metal:</b>			
1 1/4-quart.....	2	2	2 ea.
3-quart.....	3	4	4 ea.
5-quart.....	2	3	4 ea.
11-quart.....	1	2	3 ea.
30-quart.....	1	1	1 ea.
<b>Pan:</b>			
<b>Bake and Roast</b>			
3 1/4 x 10 x 26 inches.....	6	12	16 ea.
4 x 12 x 20 inches.....	3	6	9 ea.
Ban, 1 x 18 x 26 inches.....	4	6	8 ea.
<b>Cake:</b>			
2 1/4 x 10 x 26 inches.....	16	24	36 ea.
Tubed, 9-inch diameter.....	6	12	16 ea.
Dish, 20-30 quart.....	1	2	2 ea.
<b>Fry:</b>			
12-inch diameter.....	2	3	4 ea.
14-inch diameter.....	2	3	4 ea.
Loaf, 10 x 5 x 4 inches.....	3	4	6 ea.
Muffin, 12-cup.....	10	15	30 ea.
Pie, diameter 9 x 1 or 1 1/4 inches.....	18	24	36 ea.

See footnotes at end of list.

	<i>Suggested quantity</i>		
	<i>Number of beds</i>		
	<i>50-75</i>	<i>100-150</i>	<i>200-225</i>
	<i>A*</i>	<i>B†</i>	<i>C‡</i>
<b>Utensils—Cooking and Baking and Serving</b>			
<b>Pan—Continued</b>			
Sauce with cover <sup>a</sup>			
2-quart. ....	2	4	6 ea.
6-quart. ....	2	5	4 ea.
8-quart. ....	1	2	2 ea.
Servier, food holding, standard sizes.....			
Pot stock with cover			
5 gal/on. ....			
10 gallon. ....			
<b>Tableware—Patient Tray Service</b>			
<b>Dinnerware:</b>			
Bowl, cereal, 10 ounces.....	6	12	24 doz.
Cup, tea, 6 ounces.....	9	18	36 doz.
Dish, vegetable-dessert. ....	9	18	36 doz.
<b>Plate:</b>			
Bread and butter, 6-inch diameter.....	9	18	36 doz.
Dinner, 9-inch diameter.....	6	12	24 doz.
Salad, 7-inch diameter.....	7½	15	30 doz.
Sauter, tea, 5-inch diameter.....	6	12	24 doz.
<b>Flatware:</b>			
Fork, dinner.....	9	18	36 doz.
Knife, dinner.....	5	10	20 doz.
<b>Spoon:</b>			
Soup.....	5	10	20 doz.
Teaspoon.....	10	20	40 doz.
<b>Glassware:</b>			
Creamer, ¾-1 ounce.....	7	12	25 doz.
Fruit juice, 4-5 ounces.....	6	12	24 doz.
Sherbet.....	6	12	24 doz.
Tumbler, 10 ounces.....	12	22	30 doz.
Carafe, water, individual.....	5	10	20 doz.

	<i>Suggested quantity</i>		
	<i>Number of beds</i>		
	<i>50-75</i>	<i>100-150</i>	<i>200-225</i>
	<i>A*</i>	<i>B†</i>	<i>C‡</i>
<b>Containers, beverage, metal, insulated.....</b>			
Cover, metal, plate.....	30	100	200 ea.
Shell for heated metal discs.....	-	100	200 ea.
Tray, serving, 14 x 10 inches <sup>1</sup> .....	7½	12½	25 doz.

#### Tableware—Personnel and Visitors

<b>Dinnerware:</b>			
Bowl, cereal, 10 ounces.....	6	12	24 doz.
Cup, tea, 6 ounces.....	9	18	36 doz.
Dish, vegetable-dessert.....	9	18	36 doz.
<b>Plate:</b>			
Bread and butter, 6-inch diameter.....	9	18	36 doz.
Dinner, 9-inch diameter.....	6	12	24 doz.
Salad, 7-inch diameter.....	7½	15	30 doz.
Sauter, tea, 5 inches.....	6	12	24 doz.
<b>Flatware:</b>			
Fork, dinner.....	9	18	36 doz.
Knife, dinner.....	5	10	20 doz.
<b>Spoon:</b>			
Soup.....	5	10	20 doz.
Teaspoon.....	10	20	40 doz.
<b>Glassware:</b>			
Creamer, ¾ to 1 ounce.....	7	12	25 doz.
Fruit juice, 4-5 ounces.....	6	12	24 doz.
Sherbet.....	6	12	24 doz.
Tumbler, 10 ounces.....	12	22	30 doz.
Tray, serving, 14 x 10 inches.....	4	8	12½ doz.

\*A—00 to 125 meals at peak (noon) period.

†B—150 to 200 meals at peak (noon) period.

‡C—250 to 430 meals at peak (noon) period.

<sup>1</sup>15 x 20 and 16 x 22 inch trays also available.

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